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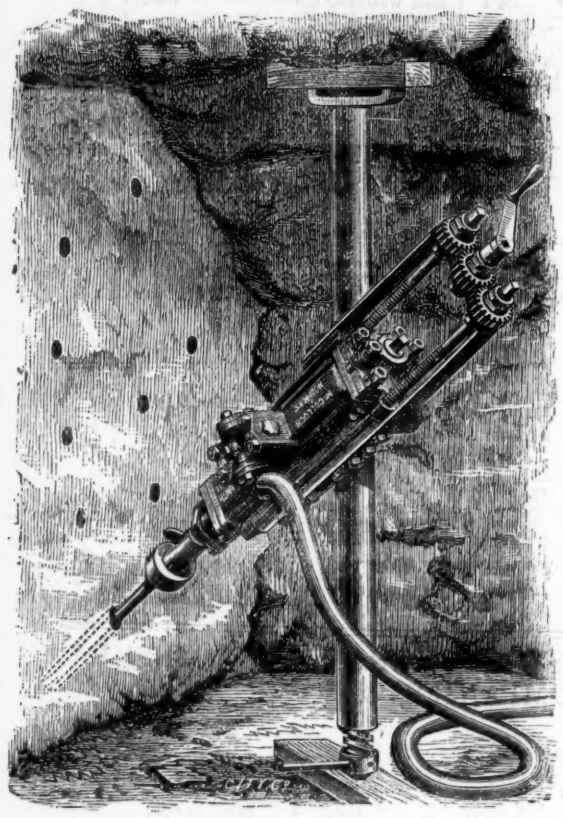

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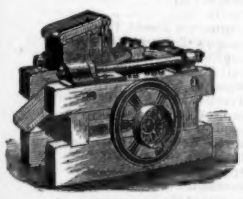

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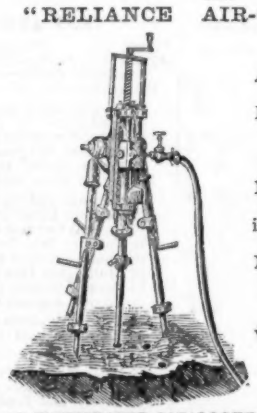

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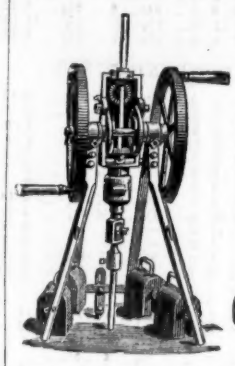

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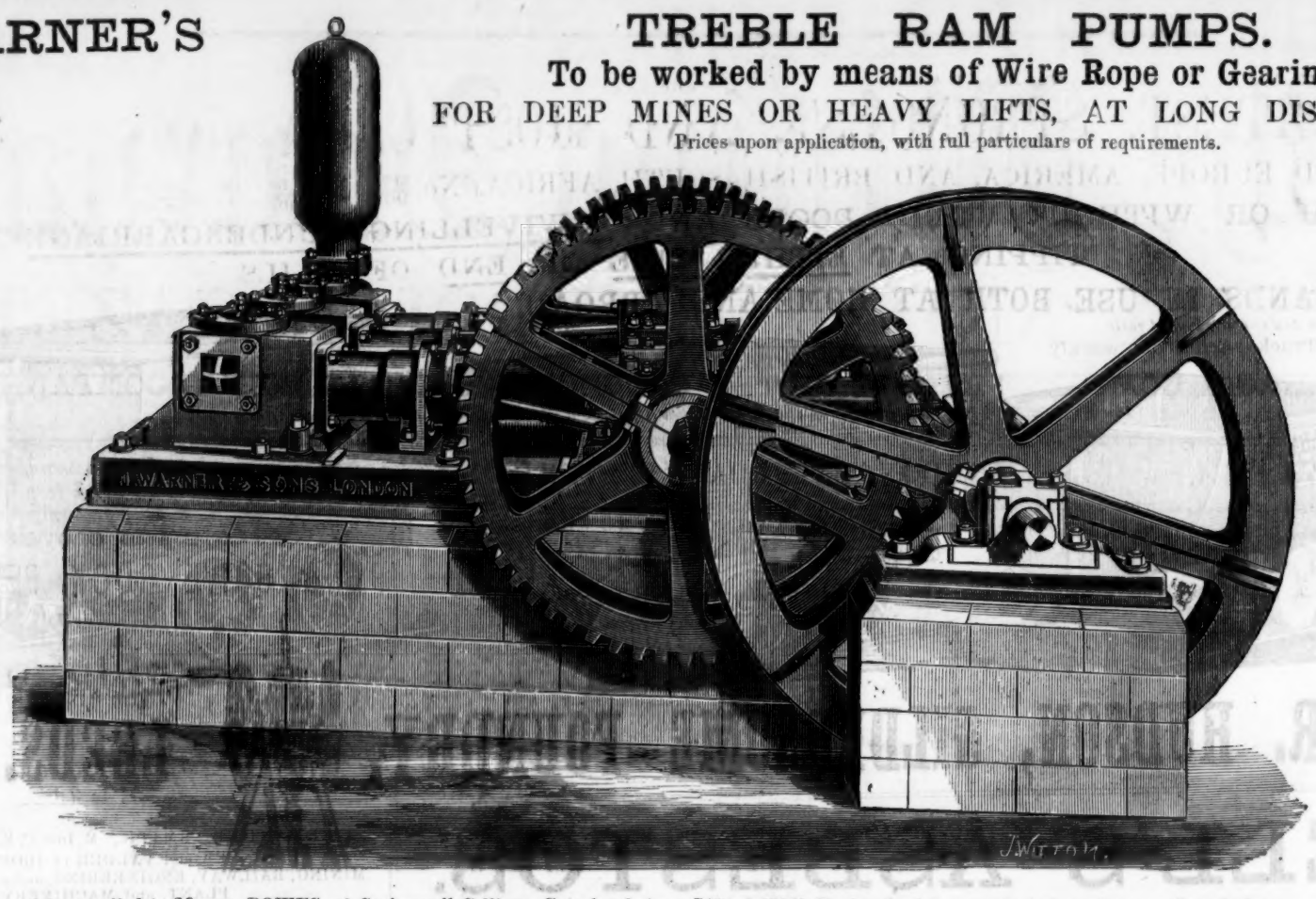

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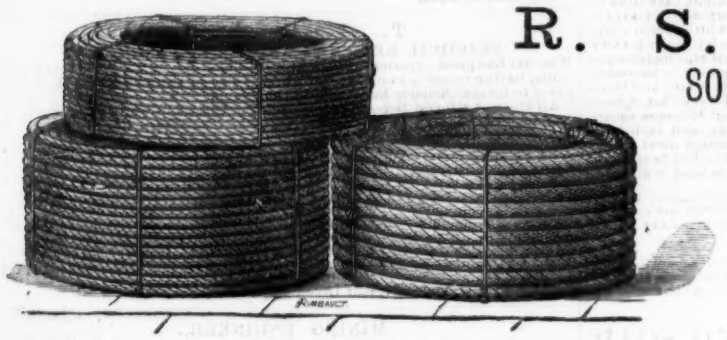

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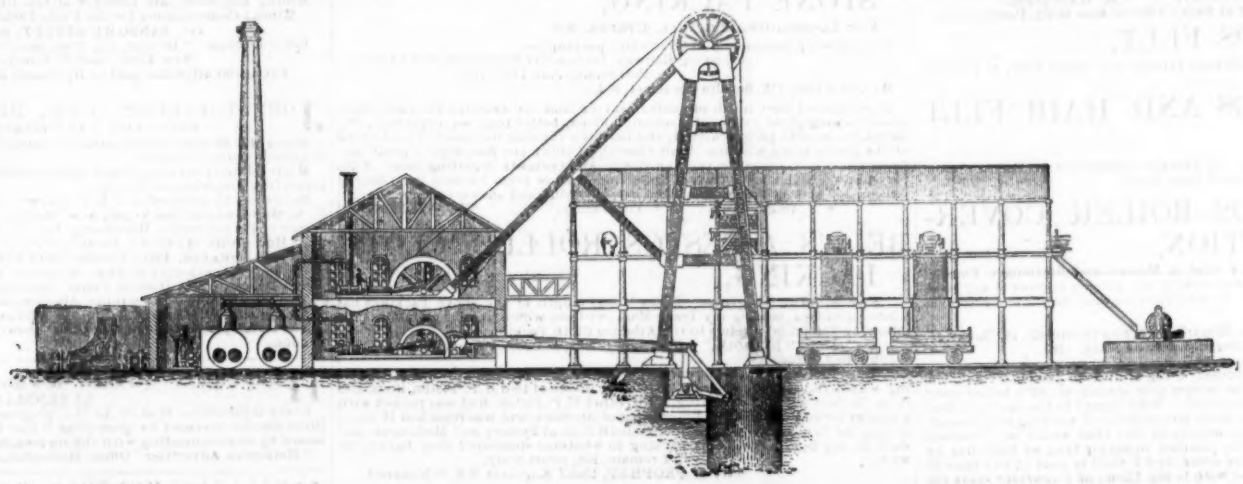

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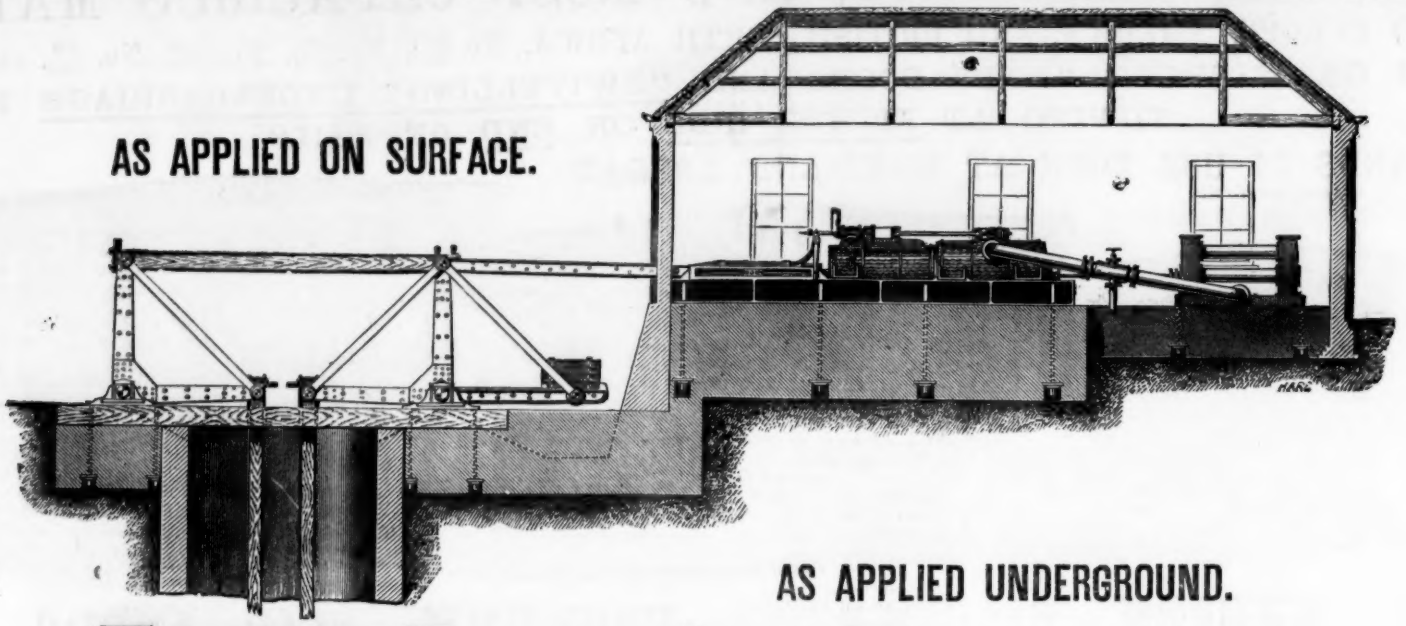
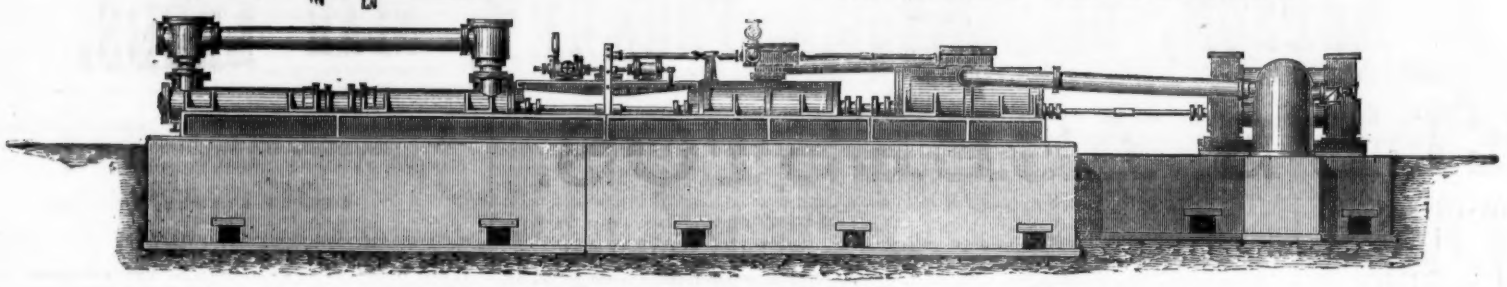


AS APPLIED UNDERGROUND.

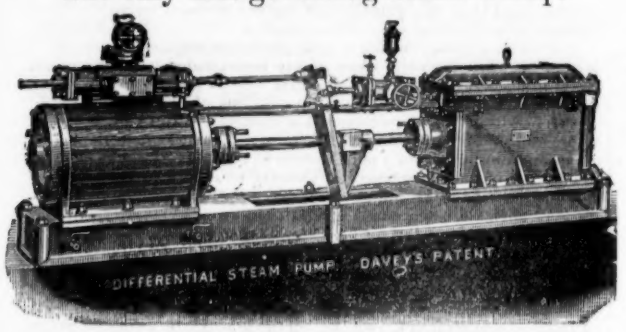


MINING MACHINERY OF ALL KINDS.

Hydraulic Pumping Engines and Hydraulic Machinery of all kinds.

THE DIFFERENTIAL STEAM PUMP.

The only Self-governing Steam Pump.



See Reduced Price List.

PRICE LIST.

Diameter of Steam Cylinder. Inches.	Diameter of Water Cylinder. Inches.	Length of stroke. Inches.	Gallons per Hour.	Height to which water can be raised with 40 lbs. steam pressure. Feet.	PRICE. £	Price with Condenser, in Suction Pipe. £	Price with Air Pump Condenser. £	Diameter of Suction and Delivery Pipes. Inches.	Diam. of Steam Pipe. Inches.	Diameter of Exhaust Pipe. Inches.
10	5	15	5,200	250	65	72	85	5 3/4	1 1/2	2 1/2
10	7	15	10,400	130	70	80	100	6	1 1/2	2 1/2
10	9	15	17,300	70	85	100	120	4 1/2	1 1/2	2 1/2
12	6	24	6,500	250	90	104	130	5 1/2	2	2 1/2
12	7	24	10,500	180	96	110	136	6	2	2 1/2
12	8	24	13,500	140	100	114	142	7	2	2 1/2
12	10	24	21,300	90	120	136	175	5 1/2	2	2 1/2
14	7	24	10,400	250	110	130	156	5 1/2	2 1/2	3
14	8	24	13,500	190	120	145	165	6	2 1/2	3
14	9	24	17,300	150	130	150	172	6 1/2	2 1/2	3
14	10	24	21,300	120	140	162	190	7 1/2	2 1/2	3
14	12	24	30,800	80	160	190	216	9	2 1/2	3
16	8	24	13,700	250	140	170	195	6	3	3 1/2
16	9	24	17,300	200	150	180	215	6 1/2	3	3 1/2
16	10	24	21,300	160	160	196	225	7 1/2	3	3 1/2
16	12	24	30,800	110	180	220	246	9	3	3 1/2
16	14	24	42,000	80	200	242	264	10 1/2	3	3 1/2

COPPER IN WYOMING.

A late Denver paper says: "The first copper smelter in Wyoming is that of the Copper Company, situated at Fairbanks, on the North Platte, 100 miles north of Cheyenne, which is being run under the general management of Colonel A. T. Babbitt. The net profits of the works with a single 30-ton smelter are said to be not less than $40,000 per month. They have now on hand at Cheyenne 150,000 pounds of bullion awaiting shipment, and four times that amount piled up at the works. This company is running the Pacific Copper Smelter, built by Rankin, Brayton, and Co., of San Francisco and Chicago, and speak most enthusiastically of its successful operation. The copper interests of the country are certainly greatly indebted to the firm named for solving the problem of the effective and economical reduction of copper ores."

UTILISING WASTE HEAT FROM BOILERS.

To provide a simple, cheap, and efficient apparatus, or fuel economiser for utilising the waste heat escaping from the flues of steam-boilers for heating feed water, and one which though specially applicable to the class of boilers known as the Lancashire or Cornish type, may be adapted to other kinds of steam-boilers, Mr. WILLIAM HALL, of Cardiff, has patented an invention, which consists in an arrangement of flat iron chambers fixed at the back end of steam boilers or between the boilers and the chimney stack in any suitable manner. He constructs these flat chambers with either plain or corrugated surfaces and each chamber being divided into a number of passages through which the feed water is forced on its way to the boiler. The passages are so arranged that the water passes up and down through a series of them, a constant circulation being thus maintained so that the water reaches the boiler at a greatly increased temperature. The shape and position of the water passages referred to may be varied to suit the class of steam boilers to which the apparatus is applied.

In describing the invention as applied to an ordinary two-flued Lancashire boiler, two of these chambers are fixed in place of the wall at the back end of the boiler and form the wall also for the back flue so that the apparatus first receives the heat striking against it on the first return of the flue and subsequently receives heat on the opposite side, on the final escape of the heated air or gases to the chimney through the main back flue. He can also use two other chambers of lesser capacity fixed at right angles to those previously named, so as to receive heat on both sides. All these chambers being connected the water on its way to the boiler passes through all the passages contained therein. The chambers may be made of wrought or cast iron or other suitable metal. He prefers to arrange a series of scrapers kept continually moving up and down with a reversing motion to remove any soot adhering to the surfaces of the chambers. When the apparatus is applied to a series of boilers he prefers to pass the feed water through the whole series of apparatus for each boiler.

MINING MACHINERY.

SCHRAM'S Patent Direct-acting ROCK DRILL,

Patent AIR COMPRESSORS

OF THE MOST EFFECTIVE AND ECONOMICAL CONSTRUCTION.

IMPROVED SUPPORTS FOR DRIVING, SINKING, AND STOPING.

CONTRACTS TAKEN. MACHINES LET ON HIRE.

Also the BEST WINDING and HAULING ENGINES, BOILERS, PUMPS, &c.

ILLUSTRATED CATALOGUE AND PRICE LIST ON APPLICATION.

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LONDON, W.C.

Messrs. OLIVER and CO. Limited,
SOLE MANUFACTURERS,
BROAD OAKS IRONWORKS
CHESTERFIELD.

ESTABLISHED 1825.

EDWIN LEWIS AND SONS,

Patent Tube Works, MONMORE GREEN and Britannia Boiler Tube Works, ETTINGSHALL,

WOLVERHAMPTON.

MANUFACTURERS OF

Lapwelded & Buttwelded Wrought-iron, Steel, or Homogeneous Tubes

FOR EVERY

COLLIERY OR MINING PURPOSE.

ROYAL CORNWALL POLYTECHNIC SOCIETY.

The Fifty-first Annual Exhibition of the Royal Cornwall Polytechnic Society has been held this week at Plymouth, under the presidency of the Earl of Mount-Edgcumbe, Lord-Lieutenant of the county of Cornwall. In some of the departments there has been a little weakness; but in the most important of all, the Mechanical, there was not only no falling off, but a positive advance, the judges expressing their conviction that it had been many years since so large a number of original inventions and ideas had been brought before them. We append, as usual, notes on the more important exhibits connected with mining and allied industries.

Oscillating cylinder stamps were shown by Mr. Husband, of Hayle. This is a remarkable invention, embodying an entirely new principle of mechanical construction, and likely to lead to great results. The one exhibited is intended for stamping gold, but one on the same principle is at work on tin at Tregembo. In the original form of stamp the lifter passed through the cylinder, and considerable difficulty was found with the leather and other soft packings, which required a constant water-flow over the cylinder to keep it cool. The result in effect was, that lubrication had to be effected by water, the oil washing off easily. The lubricating material, moreover, was liable to find its way down into the coffer, which, in gold stamping, was attended with the liability of "sickening" the mercury. The mechanical novelty of the new form consists in making the cylinder a part of the connecting-rod, and in making the bonnet a second cylinder. The piston-rod forms a part of the connecting-rod, and also serves for a piston. The guides are of a very substantial character; they can be easily adjusted, and they are faced with steel, which may be easily removed and renewed. The only packing now used is metallic steel rings, no cooling is required, and oil is used for lubrication. One stuffing-box only is now needed, as the lifter does not pass through the cylinder. Another advantage gained is, that the apparatus is lessened 3 to 4 ft. in height. The stamps at Tregembo have been working four months—for three months night and day—and have not cost a shilling for repairs: 30 tons a day have been treated with two heads, working 115 blows a minute, and consuming 23 cwts. of coals for each 30 tons of stuff. The proper speed would be 125 blows, which would stamp 40 tons a day. The crystals of tin are, as a mass unbroken; the slimes are small and poor in quality, and 1 ton of iron stamped 1200 tons of stuff, instead of 200 to 300. The weight of the stamp shoe is 1¾ cwt. To this exhibit a first silver medal was awarded.

Several plans and models of safety-skips and attachments were shown, the spirit of invention having been developed by the sad catastrophe at Wheal Agar.

Mr. Bennetts, of Roskear, who invented the safety-skip in use in South Frances 25 years since, sent a model of a skip and cage on his improved plan. In the skip the action of the catches is caused by two side rods connected to the bow, which has a long slit-hole in the eye to allow the bow to drop. These side-rods are continued to the bottom of the skip, and connected to springs bearing against a cross-bar. The bottom of the skip is hung to admit of its rising in front, and giving vent to the springs in passing any sharp angles or underlay when empty. This rise can be adjusted with the underlay. When the skip is loaded the weight of the load keeps down the bottom, bringing the springs and catches into full action. In the cage the action of the catch is caused by the bar to which the cage is suspended passing through the centre. At the bottom is a cross-head and two side rods leading to the catches. The centre bar is actuated by a spring bearing against the bottom of the middle platform. This is hung on hinges to admit of its rising and easing the springs in passing sharp turns. The platform can be kept down by levers if the weight of the men is not sufficient. This was considered by the judges by far the best plan shown; but they thought it open to further improvement. One point suggested was that the clutch gearing should be within the cage.

Mr. W. F. Matthews, of Truro, sent a large model of a cage with a self-acting safety appliance of a very ingenious character. It may be described as consisting of four eccentric clutch wheels, one travelling on each side of the two cage guides. Each pair of wheels is coupled by an axle, on the centre of which is a pulley, geared by a chain to the hauling belt. The wheels are toothed on their longer diameters. When all is well, as the shorter diameters of the wheels travel next the guides, the cage ascends freely. If the rope breaks the restraining chains release the pulleys, the eccentrics come into play, and the teeth grip the guides with absolute certainty and precision. Here the principle was approved, but its application considered unsuited for the conditions of Cornish mining.

A double model, sent by Mr. Bosisto, of Perran, dealt not only with the danger of breaking rope but of overwinding. The latter is prevented simply enough by an attachment to the rope pressing against and lifting a notched guard which actuates a brake. The clutch is also of a very simple kind. The bow is in two parts, each hinged at the side of the cage, and each terminating outwards in a sharp point. When the bow is in its normal position these points are out of the way. If the rope breaks the two halves of the bow fall inwards, and the points fly out and catch in the guides. The detail here was regarded as defective, though the simplicity of the proposal was approved.

Mr. Joseph Richards, of Hayle, forwarded a safety clutch arrangement which had a very noteworthy feature in the simplicity of its releasing gear. It would require, however, guides of a new description, with a ribbed channel. A spring catch is fitted on each side of the cage, which is kept from operating while the bow of the cage is in an upright position by a kind of wedge-shaped flange, produced on each side. If the rope breaks the bow falls, the springs are released, and the ribs are at once caught. There was no doubt as to the efficacy of this plan, but it was regarded as decidedly inapplicable in the county.

Mr. Tregonning, Stithians, had a plan which worked easily and well in model by means of a couple of toothed sectors, operating very much upon the same principle as Mr. Matthews'. The judges believed, however, that there was not sufficient grip for a cage to maintain its position when loaded.

Mr. Clarke, Star Cross, sent a sketch of the safety brake invented by Sir W. Armstrong for the hoist used in Grimsby hydraulic tower. The catch is an eccentric wheel with toothed edge, kept away from the guide by a spring when in ordinary use. When the lift rope breaks a chain is set loose, and the spring brings the toothed wheel against the wooden guide. The greater the weight the firmer the hold.

Capt. James Thomas exhibited a model of a skip-road in use at Pedn-an-drea, upright and underlie, with an automatic arrangement which brings the skip at the bottom in direct position for filling. This was regarded by the judges as one of the most valuable improvements that have been made for some time in skip-roads and fittings, and a second silver medal was awarded.

Mr. J. M. Martin sent a capital model of Nicholls's engine-shaft at Violet Seton, which was sunk 80 fms. and the pitwork fixed complete in 80 weeks, by an average of 14 men, and without accident. Three special features were noted—(*a*) The sliding pump-rod, which enabled men to sink 4 fms. without bringing the rods to surface to be lengthened; this is done by a screw and bracket arrangement. (*b*) The sliding casing-door, which was worked successfully in sinking two engine-shafts between 80 and 90 fms. without accident, all the stuff being drawn with a steam-whim. The door is kept low enough, should anything fall, to prevent accident. (*c*) Safety gates, which are thrown down after the kibble passes through. Worked by the aid of a balance, these gates can be attended to by a boy. Stuff can, of course, be drawn from the level where the gates are hung without danger to the men in the bottom of the shaft. The judges failed to recognise novelty here, save in the point of the sliding-casing door; but were glad to see the model, as a proof of the attention being paid to improvements in pitwork and shaft-sinking.

An excellent model in work of the old Newcomen pumping-engine was shown by Mr. F. W. Michell, who has been indefatigable in his labours in promoting the success of the department, and who here contributed a very novel and interesting feature.

Another exhibit of much interest was an original drawing by the famous engineer, Richard Trevithick, made some 80 years since. It was shown by Mr. Bennetts.

Several drills were shown, but all familiar, with one exception. They were the Eclipse, Cornish, Barrow, Stephens, and Excelsior, and the drill trials formed a special feature in the week's engagements. With the trials of the pulverisers, however, to be noted hereafter, they occupied so much time that we must postpone our notice of them until next week, to do them the fuller justice.

Messrs. Macdermott and Glover, London, had the new feature in drills. They exhibited two of their hand-power drills, constructed to be worked by two men; the blow is given by a strong coiled buffer spring, the tool being operated on by four cams. At 70 revolutions a minute, which is regarded as about the normal speed, 280 blows, therefore, are given. The feed is perfectly automatic, and no adjustment is needed, the tool being driven to its full length as required. Hitherto hand-power drills have not been a success in the county, and it is said of one introduced at Wheal Eliza that the "pare" to whom it was entrusted declared they would rather drive for less money by hand. However, that was some years ago.

Messrs. Hathorn and Co., London, with their Eclipse had the hydraulic tunnel car. Both the centre column and the cross bars are fixed by hydraulic pressure. One very great and special recommendation is the lightness of the arrangement, for it only weighs 11 cwts., and can be easily handled by a couple of lads. The cross bars are raised by turning on a screw on the column, and the carriages are run out and in by working on a flat groove in the bottom of the bar, and can be fixed at any angle or joint required, They had a second silver medal.

We now come to the pulverisers, of which three were entered for competition.

The pulveriser sent for trial by Messrs. Michell and Tregonning is on their well-known plan—one that has been in use at Wheal Peevor. Samples of tinstuff from Wheal Agar before and after treatment in this pulveriser have just been sized by Mr. Darlington, with the following results:—

BEFORE PULVERISATION.			
x-6000 holes per inch		22·3	
6000-12,000	„	14·8 =	37·1
12,000-0	„		62·9
			100·0
AFTER PULVERISATION.			
All passed through 0-12,000 holes per square inch,			
or 0-12,000			100
x-12,000			37·1
Reduced from 12,000 to 0			62·9

That is to say, the work done by the pulverisers was reduction in this ratio of 63 per cent.

The machine works at 15 revolutions per minute, and contains 6 cwts. of stuff.

Capt. Nicholl's pulveriser is a cylinder with a revolving barrel working upon a false bottom. The cylinder is 24 in. in diameter, and the barrel 3 in. less. There are four rubbers, each consisting of three segments in one casting. The rubbers are 7 to 8 in. wide by 18 in. in length. There are slots between the rubbers, and the bottoms are also perforated throughout. The cylinder is horizontal, and the stuff is fed at the side and discharged at the back about 5 in. from the bottom. The levers, which form a special feature, are at each end of the pulveriser, lifting at pleasure, and by taking up the weight materially reducing the friction. The material of the machine is cast-iron. The power required is a little over one horse, and it has been working at 25 revolutions, but the speed required is about 50.

Mr. Pryor's pulveriser is a new form shown for the first time, and the special feature is that the tube into which the stuff is fed revolves and not the weights, and that there is an eccentric motion given to the latter. The tub is 40 in. over, and is made of wood, with iron bottom. This it is claimed will last much longer than iron only for burnt leavings. By revolving the tub instead of the weights a great deal of friction is believed to be saved, and less water is required. The discharge is through the centre or upright shaft, where the water is comparatively still. The eccentric action given to the weights gives them a rolling motion and lifts them to enable the rough grains to pass. One horse power is stated to be required to each two tons of sand and water. The weight on the rubbers is regulated by levers. The speed is 30 to 40 revolutions a minute.

Capt. Teague, jun., sent a model of his new pulveriser, which is an adaptation and improvement on the horizontal drum machine. The special feature is his very clever and effective arrangement for lifting the shaft through the crown wheel without interfering with the working of the gear or stopping the engine.

A second silver medal was awarded to the highly ingenious and beautifully made "dead beat sectioner" of Mr. J. P. Maginnis, which enables the draughtsman to rule equally spaced parallel lines with the utmost precision and rapidity. By its aid lines can be ruled up to the 260th of an inch with the nicest regularity; and the work executed is really of the most exact character. To draughtsmen who take an interest in the look of their work such an instrument is invaluable. His "universal sector" is highly commended. Its special object is the making of scales to suit shrunk drawings, lithographs, &c., but its uses are manifold, where the division of lines, angles, &c., or the enlargement or reduction of proportion is concerned.

The patent Gosling boiler fuel economiser, exhibited by Mr. R. W. Taylor, of Bury St. Edmunds, consists of a series of discs placed at intervals in the boiler flue. These discs are made of the best fire-clay, about 2½ in. thick, and about 11 in. smaller in diameter than the size of the flue. The discs are each made in three detachable segments, and each stands on two feet. The principle is to utilise the heat generated by the furnace inside the boiler, and not in the flues outside. This is effected by causing the heated air and gases to impinge against the whole surface of the boiler flue, and especially against the bottom part. The narrowing of the draught space also leads to improvement in that direction. The judges highly approved of this device, and saw an additional gain in the radiation from the heated discs themselves. A first bronze medal was given.

A series of canvas valves were shown by Mr. Mayne, of Pool, which have been proved for some years in actual working, and have been found to last two or three times as long as indiarubber, while they do not cost more than a third or a fourth. They are made, moreover, of what has hitherto been a waste material, the cuttings from the manufacture of tin sacks. Canvas valves have often been used as a makeshift, but this is the first time they have been made for permanent use. First bronze medal.

Messrs. L. Olrick and Co. had a first bronze medal for their self-feeding ratchet-brace, an excellent tool which is not only self-feeding, but which enables the feed to be varied with the size of the hole to be drilled. It is self-contained, does not require any tommy or spanner, and saves something like half the time usually occupied.

The Bower-Barff process for the protection of iron from rust by coating it with a film of magnetic oxide is too well known to need description. Several excellent specimens were exhibited. The process is now in operation not only in London, but in Glasgow, Wolverhampton, Walsall, St. Neots, and Wednesbury.

Messrs. Bolling and Lowe, London, had a specimen plant of their light portable railway, as adapted for mines, plantations, farms, manufactories, brick-fields, market-gardens, gas and water works, and as feeders to main lines. This system is based on the distribution of weight over several small wagons, laid in rails and sleepers, which spread the weight over a large surface. A length of the ordinary rail can easily be carried by one man—a switch and crossing which is made in two pieces, by two. There are three forms of rail each with its special adaptation to different lies of country or kinds of ground. It was highly commended.

Davey's patent differential valve gear was shown by Messrs. Hathorn, Davey, and Co., of Leeds. It is, of course, no novelty, but an arrangement which has been thoroughly tested in practice over a period of years. One of the most recent testimonies to its value is that of the Yarside Colliery Company, who certify that after charging interest on capital, all wear and tear, and depreciation, &c., on the most liberal scale, the total cost is less than ¼d. per 1000 gallons reared 100 ft. high.

In the latest improved form of Blake's stone-breaker, or sectional inshrined crusher, shown by Messrs. Olrick and Co., London, the toggles are placed on top. All the tensile strains are upon wrought iron or steel; the weight of the heaviest piece is but 22 cwts.; it has double the strength of the old forms; the strike of the jaw can be maintained at any required length, and among other points it is so cushioned as to permit partial revolution of the fly-wheels before coming to a step in case of undue strain.

Messrs. Griffiths, Berdoe, and Co., Liverpool, sent samples of their enamel paint, which dispenses entirely with the use of varnish—two coats being considered equal to three of ordinary paint and one of varnish, as illustrated by the examples sent. A first bronze medal was awarded.

Well's patent cast metal unbreakable lamps and oil feeders were shown in various forms. There is no question as to the strength and durability, and over 200,000 are already in use. They may be employed with advantage for many purposes in mining. The award was a second bronze medal. They were shown by Mr. Taylor, Bury St. Edmunds.

A most attractive display of wire and wire-work goods was made by Messrs. Johnson, Clapham, and Morris, of Manchester, which was much admired.

Messrs. Fleming and Co., of Edinburgh, had a fine sample of their patent solidified oil with their lubricators. The melting point of the oil is that of boiling water, and though solid it is soft, unaffected injuriously by cold, and adopted for use wherever tallow and suet are applicable.

One of the finest examples of wire-rope ever made for finish and strength was sent by Messrs. Stephens, of Falmouth. In plough steel it will carry 150 tons.

Quite an exhibition in itself was made up of the contributions of ventilating apparatus, sent by Messrs. Boyle and Son, London and Glasgow; Messrs. Lamb and Co, London; Messrs. Uttley and Fawcett, Liverpool. The Boyle system, as is well-known, consists in the application of self-acting air-pump ventilators, all the parts of which are fixed. Messrs. Lamb's "Triumph" ventilators consist of a revolving cone or cones placed over a fixed cone. Messrs. Uttley deal specially with ship ventilation, making ventilators so strong that they will stand any weather, and fitted with self-acting cork valves, which rise with the dash of the water. The judges thought this the most effective method yet introduced, and awarded a second silver medal. Messrs. Boyle and Messrs. Lamb both had a first bronze medal for the ventilation of buildings.

The Acme fresh water condenser of Messrs. Fraser and Co., of Liverpool, had a first silver medal. The special feature of the condenser is the formation and jointing of the annular chamber or tubes. The tubes being corrugated give the greatest surface in the smallest space, while the corrugations break up the volume of steam, and baffle the water passing through the condenser. The corrugated chambers have the edges turned over a copper wire, and these are jointed to the ring by through gun metal bolts and nuts, the packing being of braided paraffin wick, well saturated in boiled oil of the consistency of marine glue.

Mr. R. W. Tayler's patent automatic safety shield for circular saws, which took the special prize offered by the Royal Agricultural Society in 1881, had a first bronze medal.

The collection of gas working and warming apparatus, shown by Messrs. Wright, of Birmingham, the best ever shown at the Polytechnic, had a second silver medal, while Messrs. Beynon and Co., of Torquay, had a first bronze for their griller.

Mr. E. T. Newton, of Camborne, sent several improved mining instruments, and was highly commended for his combined miner's theodolite, dial, and dumpy level.

Messrs. Davey, Sleet, and Co., Crafthole, had an ingenious little device, an automatic belt fastener for driving belts. It is a kind of bevelled clip through, or rather into, which the ends of belts are passed, and the arrangement is such that the heavier the strain the tighter the grip. A first bronze medal was awarded.

A first bronze medal was likewise given to Messrs. Alexander and Co., London, for their spring harness snaps and slip hooks. The judges noted that the principle of the hooks could be applied with advantage for hauling and landing kibbles.

The "Fire Queens'," which are the improved extincteur, shown by Messrs. Sinclair, London, were highly commended. His excellent instantaneous hose coupling had a first bronze medal, and the same grade medal was given to his illustrations of Warnerised goods. "Warnerisation" is a new process for rendering water repellent, and to prevent moth and mildew. It does not affect colour, and when applied to clothes permits perspiration to pass off.

The Exhibition was opened on Tuesday by an address of a general character from the President—the Earl of Mount-Edgcumbe—following which were speeches by Sir John St. Aubyn, M.P., and Mr. Warington Smyth, F.R.S.

Mr. SMYTH made some very practical and telling remarks concerning the calamity at Wheal Agar, and the various plans proposed for securing the safety of miners when ascending or descending in skips or gigs. Having had a long experience in different mines of Great Britain, he had seen much of the methods which were employed in different cases for getting over the difficulty of the serious labour and frightful detriment to health incurred by men who had to travel up and down hundreds of fathoms. Amongst these various methods it was a great satisfaction to remember that to the Polytechnic Institution they owed the establishment of that excellent contrivance the man-engine. The man-engine had been employed with the slight modification of one rod instead of two in several of the mines of Cornwall, and probably if more attention had been given to the sinking of the shafts in Cornish mines, and if the shareholders in the mines had more knowledge of the mines themselves, and more feeling for the men employed in them, as well as insight in the various means of economising their own resources, more of these machines would have found a place in the county. Failing this the mode which had been employed was that of applying the rope by which the ores were raised to the surface, in raising and lowering the men in a skip or gig, trusting to the character of that rope to save them from the chances of accident. Unfortunately there had been two terrible accidents—one at Botallack and one at Wheal Agar—which had shown the frightful character of the danger thus incurred, and it had been one of the great advantages of that Institution, and was one of the great points which had obviously excited men's minds and arouse the feeling of those who recognised that they had something to do with the improvement of mechanics, to bring forward a principle and method by which it was hoped such accidents might be avoided in the future. Safety appliances to cages were first brought forward in this country at the Exhibition of 1851, when a mechanician of French origin, named Fourdrinier, showed an apparatus intended, when the upward strain of the rope was removed, to bring in an arrangement of clips to hold the gig firm in its place. That machine was erected in a good many mines at the time; but it had to be borne in mind that the shafts of coal and metalliferous mines were very different, the former being perpendicular and the latter often inclined, and that in various directions; the consequence being that the apparatus which might be adapted with comparative facility and security in the one case could not be applied under the same favourable circumstances in the other. In the latter, too, there was not only wear and tear, but there was to be recollected—what he did not think had been sufficiently regarded of late—that the ropes in Cornish mines were subject to the influence of acids in the water of the mine. In consequence of that corrosion they required to be more frequently looked after, and perhaps in many cases should be protected by some external means against the action of the "strong water" as the miners called it. As regarded the checking of the gig in case of fracture of the rope the ingenuity of mining engineers and others had, since the Exhibition of 1851, been brought so fully into play that there were at least 50 different varieties of apparatus bearing upon that matter. Many of these had been erected in English collieries and those of Prussia, Belgium, and France for a number of years past. But strange to say, in those very collieries where they had been applied for 20 or 30 years they would be found all stripped away, the simple reason being that the rate of speed with which the cages were raised and lowered in these shafts was so great that the rope was apt to

make a surge, the consequence being that the catches were often brought into play when not required, inducing some of these very chances of accident which all the apparatus and care were intended to meet and to obviate. That was the reason why, in a great number of instances, many of these appliances when fairly tried were set aside. Now came the question—was the velocity so considerable in the Cornish mines that the same drawback would arise? He thought not. As a general rule, the speed therein was so much slower that inventions of the kind referred to might meet with a more favourable reception and enduring application. In some of the collieries the velocity of raising and lowering was 400 fathoms (2400 ft.) in less than a minute. Hence the hint might be useful to those who were busy inventing apparatus of this kind, that the speed being moderate in the Cornish mines there were contrivances amongst those thrown aside in the colliery districts which might be of advantage in Cornwall. He was sure an institution like that, by taking the subject up, and setting before them a variety of these appliances, might do a very great deal of good in obviating the risk which was seen to be one of the saddest results which had attached themselves to the attempts which had been made for lessening the fatigue and prolonging the life of those valuable men, the Cornish miners.

MINERS' ASSOCIATION.

The annual meeting of the Miners' Association was held, according to custom, at the Polytechnic Hall, on Wednesday.

In the absence of the President, the Rev. Molesworth St. Aubyn, the Rev. Canon ROGERS occupied the chair; and those present included—Mr. W. M. Grylls, Mr. C. Twite, F.G.S., Dr. Oxland, Dr. G. Michell, Mr. W. C. Pendarves, Mr. R. Fox, Mr. R. H. Williams, Mr. Treglohan, Mr. A. L. Fox, Rev. W. Rogers, Mr. A. K. Barnett, F.G.S., Mr. Gill, Mr. Wansch, F.G.S., Capt. Teague, jun., Capt. White, Capt. Bishop, and a number of students.

The CHAIRMAN briefly opened the proceedings, expressing the continued interest which he felt in the operations of the Association, and stating that Sir John St. Aubyn and Mr. A. P. Vivian had sent letters expressing their regret at being unable to attend.

The SECRETARY (Mr. C. Twite), read the report of the Council, adding, on his own behalf, that he was very well satisfied with the work of the eight students examined by him in assaying. R. Morshead had the Council prize, with a first-class certificate. Another first-class certificate was given to Henry Rodda, and ordinary certificates to the rest of the competitors.

The Council reported with pleasure that the work of the Association had been successfully carried on during the year by the various teachers. They noted with pleasure that more classes in purely technical subjects had been successfully established, about 30 students from the Camborne, Redruth, Helston, and St. Just districts having received instruction in mine surveying and assaying. They were pleased in seeing mineralogy recovering its old position on the lists. Mr. Tyack, a teacher who formerly did good work for the Association, had taught a class in this subject at Helston, and the lecturer had taken two others. The report continued: Another satisfactory fact is the success of Mr. H. F. Collins, son of Mr. J. H. Collins, F.G.S., the late esteemed secretary, who, as a student in the Truro classes, obtained a Royal Exhibition at the School of Mines. His course of study at the school has been most successful. He has gained two scholarships of considerable monetary value, as well as the Murchison and Bessemer medals. Recently he has obtained an appointment as assistant chemist under the Rio Tinto Mining Company, and we feel assured he has a good and prosperous career before him. The financial position of the Association was reported as being satisfactory, with a fair, favourable balance. This, however, was due entirely to the liberality of the City and Guilds of the London Technical Institute. The Institute had been petitioned for a removal of the grant, which would enable the Council to largely increase the help afforded to those teaching technical subjects and working under adverse circumstances in outlying districts. This help was becoming a subject of greater importance, because the science and art authorities were evidently determined to throw the support of the classes more and more upon the localities in which they were held. In large towns the difficulty was being met by individual munificence and general subscriptions, but in districts with scattered populations the help needed could best be given by associations like their own. The Council regretted the recent determination of the Science and Art Department to discontinue awarding prizes at the May examinations to the competitors who took first-class certificates in the elementary stage. The removal of this stimulus could not but be disadvantageous, and the Council proposed replacing it by offering a 5s. book to each student who gained a first-class at the next May examinations, with half-a-crown for each first on an additional subject. At present this could only be offered for the year. As the chief difficulty in mine surveying was the imperfect mathematical training of the students it was proposed to add plain and solid geometry to the list of recognised subjects, and to offer a Council prize of 10s. to the student who should pass best in the honours or advanced stage. Acids and standard solutions, &c., would in future be supplied to classes at nominal prices, and the lecturer had got out a short series of rates on assaying, which will simplify the work of teaching. It was trusted that with these facilities, and with such help as Mr. Beringer would give, a large number of classes would be taken in assaying in the coming session. In awarding the prizes an appeal to South Kensington had to be made in nearly every case for the relative positions of the competitors. The awards were:—

Inorganic Chemistry—*Mining Journal* prize, J. Eustice, Camborne; Council, T. Holland, Helston.

Practical Chemistry—*Cornish Telegraph*, J. E. Martyn, Camborne; J. H. Preston, Penzance.

Mineralogy—No award.

Geology—*Mining Journal*, A. Angwin, Pendeen.

Applied Mechanics—*Western Daily Mercury*, J. T. Bowden, Keyham; Council, P. L. Pethick, ditto.

Theoretical Mechanics—*Mining World*, W. J. Everett, Keyham; Council, C. Mulready, Keyham.

Steam—*Mining World*, J. Eustice, Camborne; Council, J. Burchell, Keyham.

Machine Construction—*West Briton*, T. J. Harvey, Camborne; Council, J. Glanville, Hayle.

Mathematics—*Cornwall Gazette*, C. Mulready, Keyham; Council, W J. Everett, ditto.

Sound, Light, and Heat—Secretary's prize, S. Keverin, Keyham; P. L. Pethick, ditto.

Magnetism and Electricity—Mr. Treglohan's prize, A. Claxton, Keyham; P. L. Pethick, Keyham.

Building Construction—Mr. Warren's prize, O. Caldwell, Penzance; S. H. Worth, Keyham.

Principles of Mining—*Mining Journal*, S. Wren, Penzance; Council, H. Simcoe, Redruth.

Mr. BARNETT, F.G.S., expressed a hope that the passage in the report referring to the action of the South Kensington authorities for their consideration should be adopted.

Mr. TREGLOHAN seconded, and said that a very great injustice in this direction had been done by the Science and Art Department. He thought the ordinary prizes were much more valuable for the promotion of scientific education than the scholarships which had been substituted. Science teachers felt very strongly on this subject.

The CHAIRMAN thought it might be better to modify that portion of the report, and endeavour to obtain a continuance of the prizes. At present it almost looked as if they had given the matter up.

The proposal was accepted by the meeting.

Mr. BARNETT suggested that one of the new members of the Executive Council should be a practical teacher, if possible to be chosen by themselves.

The Council promised that this should be considered.

Mr. PENDARVES with great pleasure moved the adoption of the report, which so well showed the great work the Association was doing in a quiet way.—This was seconded by Captain TEAGUE and dopted.

Mr. BERINGER, the lecturer, reported as follows:—The results of the examinations in scientific and technical subjects held during the summer are rather better than those of last year, the numbers being 298 passes against 289—an increase of 9, or if the Cornish classes alone be considered, an increase of 20. The number passing in each subject are very similar to those of last year. In mineralogy there is an improvement, rather in quality than quantity, and there are eight passes in assaying, which is also an improvement. The real increase in the work done is, however, greater than that indicated in the list of passes, for the examinations are becoming much more difficult, and one or two of the classes were much interfered with towards the end of the session by builders. In mine surveying, especially, the work is badly represented on the list. Classes in this subject were taught at Pendern by Capt. Humphreys, and at Camborne by myself; yet the list shows only two passes. What is wanted here is an easier examination. The examination of the City and Guilds of London Technical Institute, conducted by Mr. Henderson, of Truro, was a very fair one, but of far too advanced a character for our students, the solution of the questions requiring a knowledge of trigonometry far beyond what can be expected from the young men attending our classes. When regard is had to the fact that most miners leave school with an imperfect knowledge of the rule-of-three it will be seen that advanced trigonometry is too much to expect of them as the result of a single session's work. In practical chemistry the standard has been greatly raised. Last year a student had to determine the composition of a mixed powder, and was allowed the use of notes. This year notes were forbidden. Two substances had to be analysed, and he was expected to answer three theoretical questions to show that he understood his work. The increase is too great, and although here and there a good teacher with a good class may get good results, as Mr. Gill, of Helston, has done, the general result is to discourage really deserving students. I sympathise with the object of the examiner, for cramming has become a fine art, which needs discouragement; but by increasing the difficulty of an examination cram is not discouraged. What is wanted is an easier examination, and frequent and severe inspection by qualified inspectors. More especially should the fair working of all educational establishments be under the close supervision of the local committee. During the session 36 classes have been at work in connection with the Association. Of these five were in organic chemistry, four in machine construction, four in magnetism and electricity, three each in mineralogy, practical chemistry, and assaying; in mine surveying, geology, sound, light, and heat, steam, and mathematics, there were two. Of these classes there were at Camborne nine, Keyham eight, and Redruth six, Pendeen and Helston three, Penzance and Godolphin two, Hayle and Pool one. At St. Ives no students sat for examination. Notwithstanding the determined efforts of the teacher, Mr. Seaman, to keep the class going at St. Agnes the class fell through from several causes, but I have reason to believe it will be at work again next session.

The report was accepted on the proposal of Mr. TWITE, who quite agreed with the remarks the lecturer had made as to the difficulty of the examination in mine surveying. He quite agreed that the standard should not be too low, but it should not be too high as to discourage every student. The real object was to give an interest in the art of surveying, not to turn out a few first-class surveyors. The Council were much pleased with the work done by the lecturer and local teachers.

Mr. R. H. WILLIAMS seconded. As to lowering the standard that cut two ways. Miners were being well educated in board schools, and, though toning down somewhat might be desirable, care must be taken that so important a matter as surveying must be efficiently learnt and carried out.

The CHAIRMAN took advantage of the opportunity to express his sense of the value of Mr. Beringer's "Analysis Notes." The raising of the standards showed that the special stimulus of the Government was not so much needed as formerly.

Mr. TREGLOHAN submitted a resolution regretting the change made by the department with regard to the prizes in elementary examinations, and asking if the minute could not be abrogated, at least, to have its operation postponed. He was glad to see the Council had taken steps to supply the want the department had created. It was a point that had been taken up also by the associated teachers of Plymouth by modifying their local prizes.

Mr. GILE seconded, and stated that the advanced prizes were really affected also.

Mr. BARNETT supported, and said he thought economy might be practised if needed in the appointment of inspectors, who had no particular qualification, except that of shooting a few niggers in Zululand, or the like.

Mr. TWITE suggested that it might be sufficient to communicate the paragraphs in the report, and that thus they might be more likely to obtain their ends.

Mr. PENDARVES also took this view, and

Mr. TREGLOHAN expressed his ready acceptance of the advice, and the modified proposal was adopted by the meeting.

Mr. R. N. WORTH, F.G.S., made a few remarks upon some interesting examples of spheroidal trap, from a dyke at Penryn Sawmills, exhibited by Mr. Howard Fox. The dyke, which was 3 to 4 ft. wide, was entirely composed of these nodules, which had three or four, and even more concentric laminæ. It was the most interesting example of spheroidal structure he was acquainted with in the West. The trap was highly micaceous, and of considerable interest in its composition as well as in its structure. Mr. Worth took advantage of the opportunity to impress upon those of his hearers who had a taste that way the importance of a closer attention to petrology than had been given locally of late in Cornwall and Devon. By themselves lithological peculiarities must be handled with caution as a source of inference; but he was satisfied that a good deal of information as to stratigraphy was to be gained from a study of petrology, and that to some extent there would have to be a return to the observations of the older geologists, if not precisely their methods. As an interesting contribution to this local petrology, he might add that he had lately found a rock on Dartmoor of singular beauty, and apparently quite new to the district, the chief components of which were black tourmaline, red felspar (microline and labradorite), and violet fluor, with a little quartz. The only other place where he had heard of a rock at all similar occurring was in the heart of Germany, as Dr. Müller had told him only that morning.

An interesting discussion followed, in which the Chairman, Mr. Wausch, Dr. Oxland, Mr. Barnett, and others took part.

The CHAIRMAN pointed out that rocks of a similar character possibly a continuation of the same dyke were found at Gwavas. Mr. WAUSCH stated that spheroidal characters were very common in Scotland.

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

The official programme for the forthcoming meeting states that tickets will be issued to members, associates, and ladies at the Reception Room, Southport, on Monday and following days, the general meeting commencing on Wednesday, when Sir C. W. Siemens will resign the chair, and Prof. Cayley, President-elect, will assume the presidency, and deliver an address. On the following day there are to be sectional meetings, and in the evening there will be a soirée in the Winter Gardens. On the Friday there will be sectional meetings, and a discourse on Recent Researches on the Distance of the Sun, by Prof. R. S. Ball, Astronomer-Royal of Ireland. On the Saturday the sectional meetings will be followed by excursions to places of interest, and in the evening a lecture to the operative and artisan classes of Lancashire will be delivered on the telephone by Sir Frederick Bramwell. Great efforts are being made by various operatives' associations in connection with the Southport Trades Council to make this a success. The lecture will be of a popular nature, and will be delivered in the Town Hall, the number of tickets issued being 2000. The Mayor of Southport has contributed 10*l.* to assist the payment of railway fares for the operatives and artisans of the county. On the Monday following there will again be sectional meetings and a lecture (illustrated by experiments) by Professor M'Kendrick, Professor of Physiology in the Glasgow University and the Royal Institution, on Galvanic and Animal Electricity. On Tuesday, Sept. 25, the sectional meetings will be resumed, and in the evening there will be a soiree in the Winter Gardens. On Sept. 26 there is the general meeting, and on Thursday excursions to places of interest. The sections are:—

Mathematical and Physical Science (Section A).—President, Prof. Henrici (President of the London Mathematical Society); Vice-Presidents, Professors Stewart and Stokes; secretaries, W. M. Hicks, M.A., Profs. Lodge and Lowe, D. M'Alister, M.A.

Chemical Science (Section B).—President, J. H. Gladstone, Ph. D. Vice-Presidents, Hugo Müller, Ph. D., Professor Thorpe; secretaries, Professor Bedson, H. B. Dixon, M.A., H. Foster Morley, M.A.

Geology (Section C).—President, Professor Williamson (Owens College; Vice-Presidents, Prof. W. Boyd Dawkins, and J. W. Hulke, F.R.S., Pres. G.S.; secretaries, B. Betley, C. de Rance, W. Topley, W. Whittaker.

Biology (Section D).—Professor E. Ray Lankester; Vice-Presidents, Professors Gamgee and Schafer, and W. T. Thistleton-Dyer, M. A.; secretaries, G. J. Haslam, W. Heap, Professor Marshall, H. Sanders, and G. H. Woods.

Department of Anthropology.—W. Pengelly, F.R.S. (Vice-President) will preside; secretaries, G. W. Bloxham and W. Hurst.

Geography (Section E).—President, Lieut.-Colonel Godwin-Austen; Vice-Presidents, Sir Rawson W. Rawson, the Rev. Canon Tristram; secretaries, J. Coles, E. G. Ravenstein, and E. C. Rye.

Economic Science and Statistics (Section F).—President, R. H. Inglis Palgrave; Vice-Presidents, Prof. R. Adamson, and Mr. J. Heywood; secretaries, Prof. Foxwell, J. N. Keynes, and C. Molloy.

Mechanical Science (Section G).—President, J. Brunlees; Vice-Presidents, W. H. Barlow and Prof. Reynolds; secretaries, A. T. Atkinson, E. Rigg, and H. T. Wood.

Original Correspondence.

MINING IN NEVADA—PRACTICAL, MECHANICAL, AND CHEMICAL.—No. II.

SIR,—Referring to my last letter, dated Aug. 10, it is not to be wondered at that mining should languish and stagnate under such conditions, or that it should have become unpopular as an industrial enterprise from its practical pecuniary results. Those who owned mills had in a majority of instances no mines and no means werewith to procure them, whilst those who owned mines of enduring wealth and value had not the means of their development, to say nothing of providing the then necessary expensive reduction works and structures. All this is changed now, $50 ore delivered at a custom mill will net the miner more than $100 ore would formerly; but that though considerable is not sufficient in the interest of mining, as those that mine should mill their own ores as a rule, and realise the full measure of profits their enterprise entitle them to, and hence the necessity of company corporations and companies have no justification in allaying themselves with any mining enterprise in this part of the country, which will not profitably supply at least a 10 stamps battery. If mining throughout the State, with sundry exceptions, has been comparatively at a standstill of late, chemistry in respect of it has not. The clamorous demand, aided by circumstances, for a less expensive and more effective method of reducing the vast quantities of ores which the mines are capacitated for yielding has stimulated experimental chemistry with results that unmistakably portend an entire revolution of the pecuniary consequences, when ample profits will become the rule instead of the exception. The first cost of the machinery and plant for operating an equal quantity of ores by the new method will scarcely be one-half of that now in general use, whilst the cost of its operations and maintenance will be at least 80 per cent. less than by the present complicated, cumbrous, and wasteful amalgamating system. With properly appointed furnaces and works, skilfully overseered and directed, the ores can be converted into bullion in the ratio of 95 to 97 per cent. of their assay value.

The process is a humid one. The ores when not found as native chlorides are resolved into that condition—that is to say, they are chlorodised by roasting with common salt, and then leeched—reduced by solution and precipitation. It is claimed and accepted on irrefragable evidence that the chemistry of the processes in subjugating the precious metals in the vats or tanks is so perfect that of all the ores worked scarcely a particle of the native chloride, or that which may have been reduced to that condition by roasting, is lost. It will, therefore, appear how all-important and vital the relation of the roasting and chlorodising of the ores is to the percentage of bullion eligible of extraction; but no time since the discovery of silver ores in Nevada has the outlook for successful mining been anything as good as at present. In view of the profitable working of low grade ores by a process at once comparatively and superlatively effective in the extraction of the precious metals—gold as well as silver—to the verge of perfection; nothing that I am aware of in this respect remains to be desired. The metalliferous resources of the country are abundant, and to a large extent practically abiding. Nothing lasts for ever, not even "the great globe which we inhabit," and mines are no exception to Nature's irrevocable mortality. But mines of considerable wealth and durability as to their continuance can now be obtained with all their improvements and indubitably evidenced sources of wealth without a money payment—that is to say, for a reasonable proportion of their profits. If anything more nearly approximating a horizontal plane than this proposition indicates can be substituted, by all means let it be submitted; but I have no conception of what it can be without a disturbance of the equilibrium it is desired in the interest of all parties concerned in mining to establish. The division of labour has been the harbinger and incentive of excellence, whether voluntary or imposed in the sciences, arts, and all industrial pursuits; and mining is no exception to the rule—labour and skill are in their proper practical application intrinsically more than the equivalent of capital in value. Why should they not, then, be recognised and appreciated in the matter and manner of mining on a somewhat correct basis? To share in equitable measure the outlay and income of speculative enterprises or an industrial pursuit by the promoters and their patrons is one of unquestionable rectitude, and that is what should be advocated and enforced. If I have mines to dispose of—as I have, which are as yet undeveloped beyond the satisfactorily ascertained physical evidences of their wealth and value, and my means not enabling me to realise that which I am morally assured they are capable of yielding—where is the propriety of my asking a premium on the help which I need, and without which my prospective treasure will avail me nothing. Supplement my labour and outlay, and the success which has attended my efforts, with an amount corresponding in value to the requirements of the enterprise on the basis of its worth, I think is all I have a right to ask or a reason to expect. If an enterprise I inaugurate proves a success it becomes a gratifying event, and that and its pecuniary results should be the sufficient reward of anyone. I express myself earnestly in this regard, as I have long since been convinced that the mania for phantoms has grown into a bulwark, against which speculative mining in the guise of investment has been dashing itself to pieces, and heaping odium on the sublimest industry of civilised humanity.

I am the bolder and more confident of the assured success of well-selected mines now than previous to the introduction of the new and vastly improved method of reducing the ores, although my conclusions at no time wavered as to the result of well-appointed and well-conducted enterprises, and that nine-tenths of the speculations attributed to mining was exotic, illegitimate, and nefarious.

By the method of reduction herein referred to the elements of doubt in respect of properties as can now be had on the terms indicated above is almost, if not entirely, eliminated. It gives to mining in this country a plane and a basis wider, stronger, and surer than it ever had before, and invests the enterprise of well-selected mines—virgin, progressive, and advanced—with a certainty of their success, and in a largely increased ratio of remuneration, as firm and substantial as any commercial or industrial enterprise can be, and probably a little more so, as it is attended with less liability to accident or misfortune from external sources. High grade ores are treated as effectively by the new method as the second, third, or any other

class; but its advent is hailed with a warmer and more enthusiastic welcome, because it meets and satisfies a necessity long since sorely felt—the reduction of low grade ores on terms profitable to mining exceeding the expectation and rational hope of the most sanguine, not that its curriculum is above or below reason; but because the foundation for its exercise was—if not known to exist—unrecognised and unappreciated. One can scarcely conceive of a greater boon to mining than the inauguration and adoption of this most auspicious method. Ores of one-third the value heretofore estimated valueless ores can under moderately favourable circumstances be mined and reduced at a profit; ores containing 10 ozs. of silver to the ton—conditioned as many of the lodes and mines are here—as to the size of the lodes and the facilities for their working—can be worked at a profit, and as thousands of tons of such ores exist that can be openly quarried from the ground previous to deep development being resorted to an impetus will accrue to this industry, unlimited in its duration and extent throughout the State and beyond it.

ROBT. KNAPP.

NORTH CAROLINA AS A SOURCE OF GOLD SUPPLY.—No. III.

SIR,—In the year 1868, Mr. James W. Taylor, in his report, said—"Since the California discovery of 1848, little attention has been given to gold mining in Virginia, the Carolinas, and Georgia; but with the earnest application of inventive minds to new and improved processes of desulphurisation it is evident that the working of the Southern mines will be resumed. The deposits of gold at the United States Mint and its branches between 1804 and 1866, from the States traversed by the Appalachian gold field, are thus reported:—Virginia, $1,570,183; North Carolina, $9,278,627⅔; South Carolina, $1,353,664; Georgia, $6,971,681½; Alabama, $201,735=$19,375,891." From which it will be seen that of the gold supplied to the Mint from the five States above named North Carolina contributed as nearly as possible one-half.

Mr. Taylor says—"if we admit that an equal quantity passed into manufacturers or foreign commerce without deposit for coinage, the aggregate production would be about $40,000,000, of which fully three-fourths, or $30,000,000 was mined between 1828 and 1848." On this basis the production of gold from North Carolina from 1804 to 1866 would be about $18,500,000, or 3,700,000*l.* sterling. Hitherto the gold mining of North Carolina has been chiefly confined to placer or alluvial washings, the area of the deposits being very extensive, but the methods of treatment employed very crude and imperfect, the washings having been mostly conducted by isolated individuals with out adequate capital, and with the crudest appliances. Very little indeed in the way of organised effort has been attempted, although the field is one of more than ordinary promise. The present system of alluvial washing pursued in North Carolina is most wasteful, it being generally admitted that a large proportion of the fine gold, amounting to nearly one-half, is not recovered at all. The beds of the streams in which the sand from these washings is deposited almost invariably show gold in appreciable quantity on analysis, clearly indicating the want of some more thorough and perfect methods of working. Considerable attention is being devoted to this important and interesting phase of the question, which is one deserving of careful investigation. By some it is contended, and not without apparent reason, that the washing of the gravel is an entire mistake—that it should all be crushed or stamped, and amalgamated; and practical men in the United States, who claim to have given great attention to the subject, assert that the quartz of which these gravel deposits are mainly composed contains gold sufficient to make this suggested method of treatment exceedingly profitable. On this point I hope to be able to contribute fuller information in a future paper.—*Sept.* 12.

GOLD.

BRITISH ENTERPRISE ON THE GOLD COAST.

SIR,—The dry bones of the Guinea Gold Coast Mining Company require another shaking. Some few months since sundry correspondence in the mining papers was productive of a slight tremor, but nothing definite resulted. It is very difficult at headquarters to obtain any reliable information. We may or may not have a reef on the property we purchased. Our property is, I believe, called Izrah, but I think it will be found that adjoining is another property of the same name, and below is the South Izrah. Given these three properties, all of one and the same family, the problem is to find the reef, not the pseudo 60 ozs. of gold to the ton of quartz reef—*vide* prospectus, but any reef at all worthy of the name. Rumour hath it that the vendor has offered gratuitously another concession. First, it was said to be the adjoining one, now I hear not only from the Coast but from parties in London who ought to know, that the vendor has afforded Mr. Sweet, our manager, the selection of a property, and he has chosen one in the neighbourhood of Tomento, clean out of the district of our reputed El Dorado. Why this curious decision? and how goes on expenditure whilst this game is being played out?

Shareholders should no longer be trifled with, they were very patient at the last general meeting. Let them now agitate for an extraordinary meeting, and insist upon a full, fair, and free explanation of our position. I may, perhaps, be allowed to remark that one annual general meeting is insufficient for any company of this sort. Half-yearly meetings should be convened, or even quarterly if necessary; too long intervals should not be allowed to intervene, or directors may totally forget the existence of shareholders, as is unfortunately too frequently the case; the cash of the company continues to flow out, and no questions asked, till in due course comes the inevitable.—*St. Benet's Place, Sept.* 10.

W. J.

AKANKOO GOLD MINE.

SIR,—In my last letter I promised further observations. I sincerely regret the position the shareholders have fallen into, and from no act of their own; and it is the more to be regretted as it has quite needlessly occurred. The board will see only through Mr. Lane's spectacles. I also regret that no meeting has been held that I could attend and explain more fully to the shareholders the way their money has been squandered. When I have had a little time at the Gold Coast to collect my facts, I shall be able to send more details in general of the company's affairs for their guidance. Don Quixote was not less successful when tilting at windmills than the manager when tilting at a "blow out." [See Mr. Lane's description of the termination of his exertions.] On July 5 he writes—"After passing through the three-feet reef we have struck another reef of precisely the same character of quartz, and this reef seems to be a little over 3 ft. thick. We have blasted through and exposed a table of it near the floor of the tunnel, and in a few days we shall have it exposed and cleared away the whole size of the tunnel.

Briefly, the result of the tunnel is this—1. A thin seam of quartz.—2. A layer of mullocky pay-dirt about 6 ft. thick.—3. A reef as per samples, 3 ft. thick.—4. A fissure about 6 ft. thick filled with mullocky pay-dirt, and interspersed with ferruginous conglomerates.—5. A reef 3 ft. 6 in. thick. In every instance the quartz from both reefs when crushed and the pay-dirt showed gold freely in the pan. The gold-bearing ground where we have struck will not be much less than 20 ft. thick. In rising and possibly in driving we may find these two reefs run together." "Inventus" in a recent Journal doubted the rich find of gold in this disturbed ground, and so do I. You know, Sir, I have in your Journal, and the board know that I have in my report of May 8, most strongly charged the want of skill and judgment in the conduct of the work. Even had the "blow out" not been met with, as I foretold it would be in 1881, the result would have been the same; and I repeat the succeeding managers' endorsement, if he be a miner, will be that it is a happy event for the company that they have not met with gold, for, as I previously stated, El Callao itself could not be made to pay under such treatment, I could have saved a portion of that capital already expended if I had met the shareholders with my unvarnished tale, "nothing extenuating," and I hope to save further loss if they see this letter.

To return to the subject, I assisted Mr. Lane, and selected his mining tools (not the skeps and trucks) and before his first visit to the mine gave him a report I had drawn up for his guidance, and if he will refer to it after seeing this letter, he will find I then stated that the alleged immense outcrop on Ponsonby Hill was what it has been proved to be a mere blow out and nothing more. The alleged ferruginous conglomerate and alleged mullocky pay-dirt, are so far as I can understand the various reports the same, and consist chiefly of clay, silica, alumina, and the hydrated sesquioxide of iron. This so-called ferruginous conglomerate is very friable, and when dry can readily be reduced to an almost impalpable powder betwixt the thumb and finger, but while wet retains a great consistency. This with the ejected masses of quartz comprise the alleged pay ground of 20 ft. which the manager proposes to carry. He has cut out for the company, if they follow his counsel, an herculean task, and in the way of timbering dangerous as well as costly, and permanency of the quartz is more than problematical. Do the results of the assays justify the carrying out this enterprise?

The company are far on their way to liquefaction of the fourth decade of thousands of ponnds, and which will be fully accomplished ere any tangible results are forthcoming, and as to the anticipated crushings by Christmas and receipt of gold it is a wild dream. The results prognosticated by Mr. McCarthy so long ago as December, 1882, after a cursory inspection of the mine and opening of the works have already in great part been accomplished, and the remainder are being rapidly fulfilled.

JAMES B. ROSS.

Ealing, Sept. 10.

AUSTRALIAN GOLD MINING.

SIR,—A decided tone of improvement prevails in the several mining districts in Victoria, the new rich discoveries as mentioned in the reports of the Argus at Omeo will be the means of drawing attention to the vast fields of undeveloped auriferous country lying on the Victorian and New South Wales sides of the Australian Alps. The new gold field at Dry Gully, according to returns for the quarter ending December, 1882, had crushed 440 tons of quartz, yielding 1402 ozs. of gold, being an average of over 3 ozs. 3 dwts. per ton. Omeo is a large mining district that has had but little attention paid to it since the big rush there some 25 years ago; but now attention is devoted to the quartz reefs, and with crushings like that of the Polar Star Company giving 6 ozs. of gold per ton, capital and labour will find a large and profitable field for development. As also offering a rare opening for enterprising young men to go prospecting, and help to relieve the minds of many who ask "What shall we do with our boys?"

The Argus, July 30, with reference to gold and the gold fields says:—Some interesting items of news have been published within the last few weeks respecting mining matters, which show that gold mining will not only be a permanent industry in the colony but that it will also be very widespread. A recent crushing of 65 tons of quartz from the claim of the Polar Star Company, Dry Gully, Omeo, resulted in a return of 6 ozs. per ton. The reef which yielded the stone is from 4 ft. to 7 ft. wide, and has been followed down to 170 ft. A very rich leader, 4 in. wide, has been struck at the lower level. Fresh discoveries are being made in the locality, and it is reported that auriferous quartz has been found at Hinnomungie West, about 12 miles from Omeo, on the Mitta river. Considerable attention is also being drawn to the discoveries of quartz reefs recently made near the junction of the Dark and Mitta rivers in Gippsland, and if some of the claims being opened out there only realise the anticipations formed of them there is no doubt that a large amount of public capital will be available for thoroughly prospecting the whole district. A discovery has recently been made at Little Bendigo, about three miles north-east of Ballarat, which promises to give a fresh impetus to quartz mining in that part of the colony. Four prospectors recently came across a reef near the bed of the creek, about a mile due north of the Temperance claim, a mine that has been paying over 23 years. They quarried out the stone, and a trial crushing went over 1 oz. to the ton. About 20 tons more are at grass. The lode is about 10 ft. in width, well defined, and shows good gold.

Considerable excitement prevailed at Castlemaine on Thursday last, owing to the well-known United Ajax Company striking rich gold at the 240 ft. level. In the previous week some leaders showing nice gold were struck in both the north and south drives, and the discovery attracted much attention, as the stone made some little distance immediately below where the old run—that which was so very rich—was lost. Many anxious enquiries were made for some days after the discovery of the leaders, both by the shareholders and the public generally, as to the progress of the operations being carried on the mine, but nothing of much importance transpired until last Thursday morning, when in extending the south drive some rich stone was broken into. A number of splendid specimens of the stone had been exhibited in Castlemaine.

The yields of the Sandhurst quartz mines continue very good. For the week ending the 14th ult. the aggregate yield of gold from 40 mines amounted to 7700 ozs., which was the largest quantity obtained in any one week since 1874. The United Devon Company announced a yield for the fortnight ending the 14th ult. of 2707 ozs., making for a period of six weeks a total return of 8056 ozs. from 1545 tons of stone, or the grand average of 5 ozs. 4 dwts. per ton. Out of the money obtained from the gold 28,000*l.* was paid in dividends, the amount per share being 20s.

Reference was made in the last mail summary to the fact of payable gold having been found in Mr. Lansell's No. 180 claim, Sandhurst. As the discovery of payable quartz at so great a depth was extremely important and valuable to the colony generally, Mr. Lansell's agent was requested by the mining department to furnish them with some particulars respecting the quality of the reef. The agent forwarded a letter to the department, which was published in last summary, and he has since forwarded another to the Secretary for Mines, which is:—"July 19, 1883.—Dear Sir,—As requested in your letter of the 13th inst., I forwarded diagram of reef lately discovered in 180 mine. This has been prepared by the manager, and though not drawn to scale will, I think, give all the information you require. No retorting has taken place from this reef, and, therefore, I cannot say anything as to "actual yields;" but the fact of the reef being payable is sufficiently established. I may say that I trust I shall not be pressed on this point for the following reasons:—Mr. Lansell does not wish his yields published, and I submit that his wishes deserve consideration, as he has entirely unaided found the existence of payable stone in the deep ground, has sunk his shaft to such a depth that the adjacent mine can reach the same stone comparatively, if not entirely, dry, while he has had, and still has to contend with large quantities of water, and the adjoining proprietary—a public company—induced by his discovery, is rapidly sinking, and will in a comparatively short time reach the reef, so that the non-publication of Mr. Lansell's private returns cannot possibly affect the future providing by other holders of the stone he is now working, or to prevent their sinking for it.—I beg to remain, &c., J. E. DYASON."

The mining telegrams are very encouraging. The bore at Portarlington is down 1415 ft. There is no change of importance in the strata. In No. 2 the tubing is displaced in the bore, and it is very doubtful whether the bore-hole can be saved. The manager is using every endeavour to draw the tubing, and has not yet been successful. Another crushing of 60 loads from Messrs. Owen and Wall's claim, Hard Hills, Rushworth, has yielded 121 ozs. The stone was obtained by four men in four weeks. Messrs. Hanson and Co., Old Ned's Gully, have obtained 24 ozs. from 14 loads. The Phœnix have just washed up the 400 loads of stone put through the batteries, which have returned 300 ozs. of amalgam. In the Ada Gold Mining Company, Barmedman (N.S.W.), the miners are driving towards Jackson's Reef, which is expected to be shortly cut in the drive. Some leaders containing gold are now to be seen. The alluvial prospectors are in a deep channel, and the present shaft excites interest. The sinking is in the vicinity of the Hard-to-Find. No particulars have been given as to the assay of the peculiar mineral which permeated Barnett's cake of retorted gold. The yields for the fortnight at Daylesford are—Rising Star, 202 ozs. from 600 tons, which is rather better than the last fortnight's return; and the Cornish Company, 116 ozs. from 250 tons. This company is still busy sinking the main shaft, which prevents any quantity of stone from being hauled, quartz being only raised when the men are not at work in the shaft. A good prospect of gold has been obtained in the No. 4 tribute of the Golden Stream claim at Maryborough. The No. 4 tribute party, Duke Consols have struck the lead lost by the Old Bismarck Company. Yesterday they washed one machine for 15 ozs. 5 dwts. gold. The ground is improving as the drive proceeds. Maxwell's cleaning up (Inglewood) gives 270 ozs. from 160 tons.

The deepest mining shaft in the colony at the end of the year was the Magdala, at Stawell, which was 2409 ft. deep; other shafts in the same locality were 1940 ft., 1830 ft., 1815 ft., 1770 ft., 1565 ft., and 1220 ft. from the surface. At Sandhurst there were shafts 1800 ft., 1601 ft., and 1563 ft. deep respectively; at Maldon one of 1220 ft. from the surface, and at Clunes two shafts, 1214 ft. and 1193 ft. deep respectively.

Mr. George Lansell, one of the most successful and large mine owners of Victoria, has been rewarded for his perseverance by striking payable gold in his (180) mine at a depth of 1760 ft. (one-third of a mile). Although the agent in Mr. Lansell's absence refuses to divulge the exact yield, there can be no doubt that it is of a satisfactory nature, and, as such, will give encouragement to many other companies to follow his example and do likewise.

The importance of striking payable gold at great depths cannot but have a beneficial effect on the value of the mining companies in Sandhurst, as also throughout the colony, as it solves the question often asked, will the quartz reefs pay at great depths?

The yield last year for Victoria was 898,535 ozs. of gold; value at 80s., 3,594,140*l.*, and the total yield since the discoveries 205,743,348*l.*, and the value of all the other metals and minerals 788,653*l.* If English capitalists and investors would but take the trouble to investigate the advantages of Australian mining investments they will find a profitable field for the investment of capital.

THOMAS CORNISH, M.E.,
Author of Gold Mining: Its Results and Its Management.

SOUTH AUSTRALIA.

SIR,—Mining in this colony has for several months been in an exceedingly depressed state, owing chiefly to the tightness of the money market, which has in fact almost paralysed several local industries, and had a serious effect upon business generally. Added to this, the want of success attending many of the gold mining ventures, which in some cases were too eagerly gone into last year, has greatly shaken the faith of the public in mining generally. The low price of copper tends to check speculation in copper mining to a great extent, though there are several very good discoveries which have been made during the last few months awaiting development. Some of our speculative men, on the principle that "Distance lends enchantment to the view," have invested in claims in Queensland and New South Wales, and in some instances, though not by any means in all, have done pretty well. But our own Northern Territory bids fair to equal any part of the continent of Australia for gold and tin mining. A number of South Australians, who went there some years ago, have braved the heat of the climate, and have proved the value of many of the gold reefs that were but imperfectly tested when the mania of nine or ten years ago was at its height. Several splendid discoveries of tin have also been made, and are about to be worked.

Valuable discoveries of rich argentiferous galena have been made about 160 miles east from Terowie, a town 139 miles north of Adelaide, on the Northern Railway. These deposits of silver-lead are mostly within the New South Wales boundary in what are called the "Barrier Ranges," but are most easily accessible from this colony, and are being worked chiefly by South Australians. I believe the mines are from 12 to 15 miles on the New South Wales side of the boundary line, though a discovery is reported some miles on our side the border. The ore is good for lead—70 to 75 per cent of oxides and carbonates, and contains from 70 to 360 ozs. of silver to the ton. The average of silver from the ore already raised would probably reach 125 ozs. of silver per ton. Some ore was lately assayed which gave 10½ per cent. of silver, or over 3000 ozs. per ton. This was found a few miles south of the other discoveries, and still further in the same direction, and on South Australian soil another rich find is reported. It is difficult to say at present what is the extent of the field; but I believe it is known to extend over a length of 12 or 15 miles. It may be that Australia will yet rival America in the richness of her silver mines.

It is reported that a Melbourne syndicate have secured a large and valuable block of mineral land immediately adjoining the Moonta Mine on the north, and formerly held and worked for a time as the Wheal Hughes and Challa Mines. A quantity of good ore was raised, but the companies collapsed, I believe, from the difficulty of getting the shareholders to pay calls at a time when such payments might have resulted in making the mines pay. It is thought that at a greater depth than was reached by the old companies they will, like the Moonta Mine, produce large quantities of rich ore from the same lodes.

Some parties here have lately received account sales of a shipment of manganese, which they shipped to England a few months ago. The returns showed it to be worth 4*l.* 16s. per ton, leaving a profit of about 2*l.* per ton. If a remunerative market offers for manganese we can supply any quantity of ore very free from silica, and worth 75 to 85 per cent. Occasionally it is met with, having 2 or 3 per cent. of cobalt associated with it. The present season is the best we have had for agricultural purposes for very many years, and the hopes entertained of a bountiful harvest at the close of the year are very high. It is much wanted, for the community has not, for a great many years, been in so generally a depressed condition. Some localities in the interior are still in great want of rain; but generally, within about 300 miles of Adelaide, the rainfall already for seven months has exceeded that of the whole year 1882.

J. B. A.

Adelaide, July 28.

BRATSBERG.

SIR,—Although a few have expressed themselves disappointed with the lately announced dividend on Bratsberg shares, the financial status of the company is to-day stronger than if the directors had declared a larger dividend, and the advance in price and firmness of shares in the market is one of the proofs of it. They have acted on that principle laid down by Lord Bacon—"Have more than thou showest," and they are wise in the development of this great mine to adopt a policy of progression in dividend, rather than retrogression, which latter is always a disappointment to stockholders.

Since my last communication the actual sales of cargoes of ore have verified the estimates per ton which I then made, and which leave very satisfactory results. This dividend is a semi-annual one, ending April 30; a great deal more has been done since then towards the next dividend. If grumblers and discontents would pack up a portmanteau and take a trip to Norway they would then appreciate the amount of work that has been accomplished, the ponderous pieces of machinery that have been transported over great natural obstacles, the magnitude of the enterprise, and perhaps grasp the grand future in prospect for the owners of this mineral estate. One can form no conception of it by conversatiom with brokers and projectors, who have "their own axes to grind," or by contemplating the dingy exterior of Austin Friars, in smoky London.

I commend then the action of the management in this matter, satisfied with the present condition of affairs, and awaiting the future with implicit confidence.

BRATSBERG.

Peterborough, Sept. 10.

LONDON COAL SUPPLY WITH BEST DURHAM HOUSE COAL AT 15s. PER TON, 9D. PER CWT. DELIVERED INTO CELLARS.

SIR,—Permit me to supplement my letter in your issue of Sept. 1 by stating that, based upon the Official Annual Returns of the average London market price for several years for best seaborne house coal, and an official letter from the North of England United Coal Trade Association, Newcastle-upon-Tyne. Freight, City dues, derrick allowance to coal merchants, scorage, factors' commission, interest, and discount; paying the Durham and Northumberland house coal owners a price for their whole annual output at pitmouth in excess of their net receipts per ton for a series of years' sales will be effected at 15s. per ton, or 9d. per cwt. delivered into consumer cellars, realising a profit of upwards of 50 per cent. on invested

capital in transport materiel, &c., of proposed company to be launched on the close of the holiday season. It would be trespassing too far upon your valuable space to enter upon a mass of statistics, as there are comparatively few who have the inclination or ability to wade through an analysis, and explanation of figures so essential to compass or realise their true significance. The following official letter in the Times ought to carry conviction that the impending revolution in the London Coal Trade, by no means confined to the extent of the Great Eastern Steamship transport, is of national importance, and will confer an incalculable boon:—"It is really desirable the public should know they are being charged 10s. to 11s. a ton above the net price paid by the coal merchant."—North of England United Coal Trade Association, Newcastle-on-Tyne.

Little Tower-street, Sept. 12. W. J. THOMPSON.

BREAKAGE OF WINDING ROPES.

SIR,—In the Minutes of Proceedings of the Institution of Civil Engineers, Vol. LXXIII., just issued, at page 447 is an abstract of a paper by Franz Peters, on the Breakage of a Wire Rope at the Duke Hardenberg Colliery, Westphalia. As the circumstances attending the breakage of this rope are apparently very similar to those connected with the late breakage of the rope at Wheal Agar, it will be interesting to your readers to peruse the abstract in question:—

"On Dec. 21, 1882, a winding rope broke at the Duke Hardenberg Colliery, Westphalia, whilst raising to the surface 25 men, who lost their lives. The rope was of cast steel, and made at the works of C. L. Neufeld, of Dortmund, and consisted of seven strands, each constructed on a core of three wires, made of annealed crucible steel, each wire having a diameter of 0·005 inch. The seven wires next the core in each strand were of crucible steel, 2·2 millimetres (0·0866 in.) in diameter, and the twelve outer wires were of the same material, and were 2·4 millimetres (0·09,449 in.) in diameter. The main core around which the seven strands were turned consisted of six strands, each strand of six wires made of annealed iron, 2 millimetres (0·0787 inches) in diameter, the core being of tarred hemp.

According to the regulations of the Mining Police, the carrying power of crucible steel wire is limited to 114·6 kilogrammes per square millimetre (72·8 tons per square inch), that of annealed crucible steel to 80 kilogrammes per square millimetre (50·8 tons per square inch), and for annealed iron wire 45 kilogrammes per square millimetre (28·5 tons per square inch), and accordingly the strength of the rope was equal to a total carrying power of 71·42 tons. According to the customary trials made with the wires of which the ropes are constructed in the works, the rope was found to be capable of carrying 80·39 tons. After the breakage the Mining Police took possession of the first 5 metres of the rope next the breakage for trial, while six further metres were tried at the colliery, the results of which showed that the rope had deteriorated 18·25 per cent. after 11½ months' wear. The weight carried by the rope when raising coal was:—

	Tons.
One cage complete, double decked (for four tubs)	2·214
Four empty tubs or trams, averaging each 5·9 cwts.	1·181
Capacity of tubs—40 cwts. of coal, nearly	1·968
Weight of rope from pulley to deepest landing, 426 metres, at 6·5 kilogrammes (13·1 lbs. per yard)	3·020
Total	8·383

Thus the rope could carry 8·5 times the load, and according to the trials made with the wire, 9·6 times, while after breakage the rope was still capable of carrying 7·8 times the load.

According to the regulations enforced by the Mining Police, the weight of the men allowed to be raised or lowered must not be more than one-half of the load when coal is raised. Therefore, in this instance $\frac{1·181+1·968}{2} = 1·574$ ton, and allowing for the doors which are fixed in the cage when the men ride, 1·476 ton was the mean carrying capacity of the rope, which meant 20 men, allowing each man the average regulation weight of 1·48 cwt. (11·48 stones.) However, 25 men were in the cage at the time of the disaster, but this infringement of the law would not account for the accident.

On examination the rope showed that, after fracture, five of the seven strands were broken off nearly in one plane, and the fracture of each wire seemed as if it had been broken in a proof machine. The other two strands reached 150 millimetres and 250 millimetres beyond the fracture. This examination seemed to prove that the rope had broken suddenly. No marks were found on the guides of the pit to justify the surmise that the cage had become tight or wedged in them, and from the fact that the grease on them was found undisturbed, shows that the cage fell down the shaft without hindrance. The rope broke 1·5 metre above the shackle, and during the 11½ months of its use, had been four times re-socketed. The safety arrangements attached to the cage did not come into operation, found on examination to be due to derangement, probably the result of the sudden breakage of the rope.

The author, by elaborate calculations, endeavours to prove that the rope broke, owing to the engineman forgetting, by oversight or accident, the near approach of the cage to the surface, when winding at a considerable speed, about 13 metres per second, and, fearing an overwind, he had applied the brake so vigorously so as either to bring the engine quickly to rest, or so considerably slackened its speed that the cage travelled faster than the rope (owing to its momentum) formed slack rope, then, falling back on the slack rope, jerked and fractured it. The cage was so near the surface that the banksman just caught a glimpse of the bridle chains when it disappeared from his sight."

It will be observed that the law was infringed in this instance, 25 men riding in the cage instead of 20, that the rope snapped just as the cage reached the surface, that the breakage took place about 5 ft. above the shackle, that the rope had been four times cut at the end and reshackled, and that although the cage was fitted with doubtless one of the best of the many Prussian safety arrangements, yet that this part of the apparatus failed to act, and 25 men were dashed to the bottom of the shaft (426 metres, or 1397 ft.), and instantly killed. J. D.

MINE DUES AND LEASES.

SIR,—The question of the renewal of Tincroft lease could not have cropped up at a better season, and mining companies in a similar predicament and otherwise would do well to study the sensible and pointed remarks that fell from the Chairman (Mr. W. Teague) on the occasion of the meeting, given in detail in the *Mining Journal* of Sept. 8. Mr. Teague, like numerous other large mining speculators, is getting sick and weary of paying dues out of capital, and well he may, as few gentlemen have had reason to speak more feelingly on the subject. The terms offered by Lord Robartes to the Tincroft adventurers on the whole are quite as lenient as any hitherto offered by Cornish lords; and acting on the principal of giving everyone his due, Lord Robartes is one if not the most liberal mine lord in the county, but when we come to analyse his liberality what does it consist of? In plain English 1-26th dues (when tin is at or over 50*l.* per ton) to be paid out of the capital, until the unfortunate adventurers, should they be lucky enough to perform a most difficult feat under present circumstances, pay profits, 1-12th dues even out of these, or in other words not satisfied with taking the clothes off a man's back, but taking his skin as well. Alas! for the rarity of Christian charity. Another phase of this liberality is charging a minimum rent—a modern mode of extra bleeding the English miner—of 50*l.* for permitting the adventurers, which according to this the adventurers must be under a serious obligation to the lord in spending their capital, to work the very identical property they are paying 1-26th dues out of their capital to do so. And yet another important phase in this liberality is charging 100*l.* per statute acre for land, the intrinsic value of which is not worth 1-10th of this unmerciful charge. I may venture to say the largest quantity of land whereon mining operations are being carried on in Great Britain is quite useless for any other use beyond claiming the actual ownership of it. Mr. Pearse Jenkins' remarks at the meeting testify to me that his imaginative powers are exceedingly strong. The adventurers of Tincroft, more especially Mr. Teague, are to be commended for holding out against the terms offered them. They have now an excellent opportunity of setting an example to the county, in case the project of bringing the question before Parliament falls through, as I have a presentiment that the mines of this generation with the exception of a small percentage of their number are too weak-kneed to stand up in their own defence. W. NINESS.

Perranporth, Sept. 11.

PERRANZABULOE MI ES.

SIR,—Leaving Holywell and the wonderful propensities it formerly possessed for curing all diseases, the only reason I can assign for its waters having lost their virtue is the depravity of the bal captains in and about the district. When they return to the paths of virtue and truthfulness the healing powers of the water may return. Leaving also Phœnix Mine (Perran Silver-Lead Consols), where the sinking of the engine-shaft is vigorously going ahead in as congenial a lode for lead as can be found, to the south-west is Gravel Hill, noted for its large carbonas of iron or gossan over-riding lead and blende in the lode. In a previous communication I commented on the mode in which this run of mines had been worked, and can only confirm what I therein stated relative thereto, as I deem it a great shame that such a splendid property should be thrown away through the stupidity of the proprietors. When Gravel Hill is worked in a miner-like manner I predict it will soon enter the Dividend list as the lode contains the elements to almost warrant it doing so.

The geological features of Gravel Hill sett are worthy of more than a passing remark, and to the geologist must be full of interest; at some further date I will dilate upon them. About a mile from Gravel Hill, almost upon the run of the lode a granite cross (men *skyrfd* ancient Cornish) makes it appearance amongst the sand banks and marks the site of the old Perranzabuloe church, which was the first built with stone in England. In the fifth century St. Patrick laboured as a missionary in Cornwall, and upon his return to Ireland consecrated several bishops to carry on the sacred work he had left in Cornwall. St. Piran (a native of Osson, called Kieran in Ireland) was one of these holy men, a man of noble birth and great learning. Upon landing in Cornwall, history says, he travelled "an 18 myles." His simple banner bore a silver cross—a cross argent on a field of sable in early times was the armorial ensign of Cornwall. The present arms of the country, a sable shield, charged with 13 bezants, was the bearing of Robert, Earl of Moreton, the brother of William the Conqueror, whom he made Duke of Cornwall.

St. Piran settled himself near the sea in the district which has now for five centuries been known as Perranzabuloe, and which takes its name from "Piranas in sabulo," Piran in the fine sand (sabulum). In ancient Cornish it is "Pieran in Treth." Before that it bore the early British name of Lampiran, signifying the Church of Piran. The ancient granite cross mentioned is thought by some who have carefully examined it to have been a heathen monument, Roman or British, afterwards converted to a Christian purpose. Its venerable and time-worn appearance denotes a remote antiquity, and though formed in the rudest style has yet been described, but in what character it is now impossible to tell. It is 13 ft. in height, but looks less, several feet being buried in the sand. This cross stands about 2 miles from the pretty sequestered village of Perranporth. The remains of the oratory St. Piran set up is a little nearer; at a later period the old church was built near by, but during the latter part of the last century this church was fast being overwhelmed with sand "canced up by the north wind daily continueth his covering and marring the lands adjoynant" (Carew). The parishioners finding the removal of the sand a vain labour at last came to the conclusion that they had no alterative but to move their church further inland, and they commenced moving the old church piecemeal to assist in the construction of the present parish church. The ancient fort is the most attractive relic remaining. Its date is unknown, and from time immemorial no other has been used in Perranzabuloe. Well may the Cornish venerate the ruins of St. Piran's sacred buildings, as they remind us of the days when the Druid was still in our land, when the Roman was preparing to leave it, and the Picts and Scots scowling defiance across our northern boundary, and more than all else the commencement of the era of Christianity in our loved and hallowed isle.—*Perranporth, Sept.* 12. W. NINESS.

CARDIGANSHIRE SILVER-LEAD MINES.

SIR,—In these severe times of depression in lead mining it affords me very much pleasure in being able to report a good discovery at the Goginan Mine within the past few days. In the early part of May last I was asked to give an opinion of this property, and on May 9 I wrote:—

GOGINAN.—Until very recently all trials were being made from a certain point west of Francis's shaft on a lode or branch running 3 ft. in 1 fm. north from the main lode, which has never been proved in this direction, the adit cross-cut having been carried into the north branch without seeing the main lode, and hence the mistake in the deeper levels. A cross-cut south at the 20, from the branch, is now being driven towards the main lode, but this will be too shallow to find good courses of ore; it will, however, prove the lode to be in its right position, and by bringing back the 70, west of Francis's, on the main lode, they will have richer courses of ore than have ever yet been worked in Goginan. I have only to say that the cross-cut at the 20 proved as I anticipated, and that at the 70, west of Francis's, they have a course of ore on the north part of the lode which, for 5 ft. being carried, is reported to be worth 2 tons per fathom, the lode being 20 ft. wide, and there is now every reason to believe that Goginan with boring machinery will speedily open out a much more productive mine than it has ever proved to be.

NEW WEST GOGINAN.—Some little time ago a letter appeared from me about this mine, and saying a cross-cut has been driven at a depth of 25 fms. to cut the main lode of Goginan, and that I anticipated a rich discovery when this work was accomplished. At the time I wrote there was about 20 fms. to drive to get under the lode, where it was seen at 8 fms. deep with good copper and lead, and allowing for the underlay might make the drivage 24 fms. In March last I met a gentleman in London to effect the purchase of some shares that were unissued, and these gave 173*l.*, which has promised to be entirely devoted to carrying on the cross-cut to cut the Goginan lode. This cross-cut was driven at 6*l.* per fathom, and allowing 25 fms. at 6*l.*, 150*l.* would have carried out the work, but alas, when one-half of this was completed, the machinery was seized, and the mine stopped.—*Goginan, Sept.* 12. ABSALOM FRANCIS.

MINING INTELLIGENCE.

SIR,—It was thought a week ago there would be considerable correspondence respecting the renewal of the Tincroft lease, but it now seems that the terms Lord Robartes has granted has given general satisfaction. A report just received from Wheal Lusky shows that they must be nearing a bunch of ore, the lode in the forebreast is 4 ft. wide, with two well-defined walls. The lode is composed of quartz, yellow, black, and grey copper ore—a splendid looking lode with more water coming from the breast than had before. Trebartha Lemarne is looking remarkably well at present, and as the stamps are at work they will very soon have tin in the market; intending purchasers would do well to buy at once, for a rise is certain.—Collacombe Consols: There is a great improvement in this mine by the cutting of a new or side lode, which I see now reported 8 ft. wide. I have just seen some of the ore which is of a very high percentage. There is a great improvement in Old Gunnislake. The ore in this mine is also of very high percentage.

Callington, Sept. 12. JNO. BUCKINGHAM.

GWENNAP MINES.

SIR,—Like other rich mineral districts in the county this has for a long period been almost ignored by mining speculators. Surely the fame of the United Mines, Old Wheal Busy, and others cannot possibly have escaped their memory, and yet they still "hang fire" in trying their luck in this locality. However, from the *Mining Journal* of Sept. 8, I find there is a likelihood of a resuscitation of at least one of the "keenly bals" in the shape of East Killifreth. Being personally acquainted with Killifreth I have often wondered why the shares of this promising mine remain at a little over 2*l.*, which, according to my judgment, is their minimum price. Killifreth is a dividend mine. Certainly of late it has not paid large dividends, but the proprietors have been nothing out of pocket, so that their state is nothing near as desperate as they would have the public believe. They are many, many proprietors of mines who only wish they could to-day change "uniforms" with those of Killifreth. Any practical miner having a knowledge of the dead and expensive work recently executed at Killifreth can well understand why the dividends have been small. The situation of Killifreth and its prospects generally, with steady perseverance and less bickering, must make it one of the mines of the future.

The whole of Killifreth lodes run through North Killifreth sett. Moreover the shoots of tin in Killifreth main lode are dipping into it; such being the case, and the whole of the ground being virgin, speaks volumes for its future success. It contains two elvan courses, and their junction with the lode may reasonably be looked forward to produce beneficial results. The only work done in the property is the commencement of a shaft by the "old men," doubtless for the purpose of intersecting Killifreth main lode, as it is in position to do so. However, it was never completed. Other shallow shafts have been sunk, which with this might be utilised in the development of the property. Only a small capital is required to test the value of North Killifreth property, which is assumed, of many practical miners, will soon be found to equal if not excel in value even Killifreth.—*Perranporth, Sept.* 12. W. NINESS.

GREAT WHEAL POLGOOTH.

SIR,—In August, 1881, this company was ordered to be wound up, and an official liquidator, Mr. James Waddell, appointed. The list of contributories was settled by the Court of Chancery, and an order made on those shareholders who had not fully paid up their shares to do so on or before July 15, 1882. Since that time I have had no official communication from the liquidator, but by writing him have ascertained that the liabilities of the company have been discharged, and that some case is to be brought against the directors. Can you or your readers inform me if shareholders are to wait the pleasure of the liquidator as to bringing the matter to a conclusion, or can we compel him to disclose what course he is taking to protect our interest? It seems to me that we are at the mercy of Mr. Waddell, not only as to the time this liquidation is to be concluded, but also as to the amount of money he can expend on it. J. H.

[For remainder of Original Correspondence see this day's Journal.]

TALARGOCH LEAD MINE.—Messrs. Dew and Sons, auctioneers, of Bangor, offered for sale, at Chester, on Wednesday, the Talargoch Lead Mine, situated near Rhyl, and which has an interesting history, being probably the oldest in the country. It was, according to local tradition, opened by the Romans, and has been worked more or less ever since. The mine, machinery, and plant were put up in one lot. The auctioneer explained that there were 10 miles of tramway connecting the mine with the London and North-Western Railway and that the machinery cost 50,000*l.* The biddings commenced at 3000*l.*, and by slow increments of hundreds rose to 4600*l.*, when the mine passed into the hands of Mr. Thomas Darbyshire, of Hawarden.

ESTABLISHED 1860.

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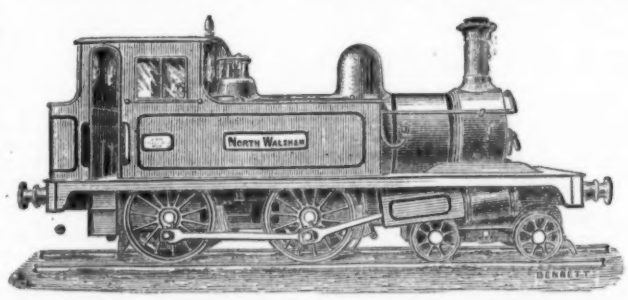

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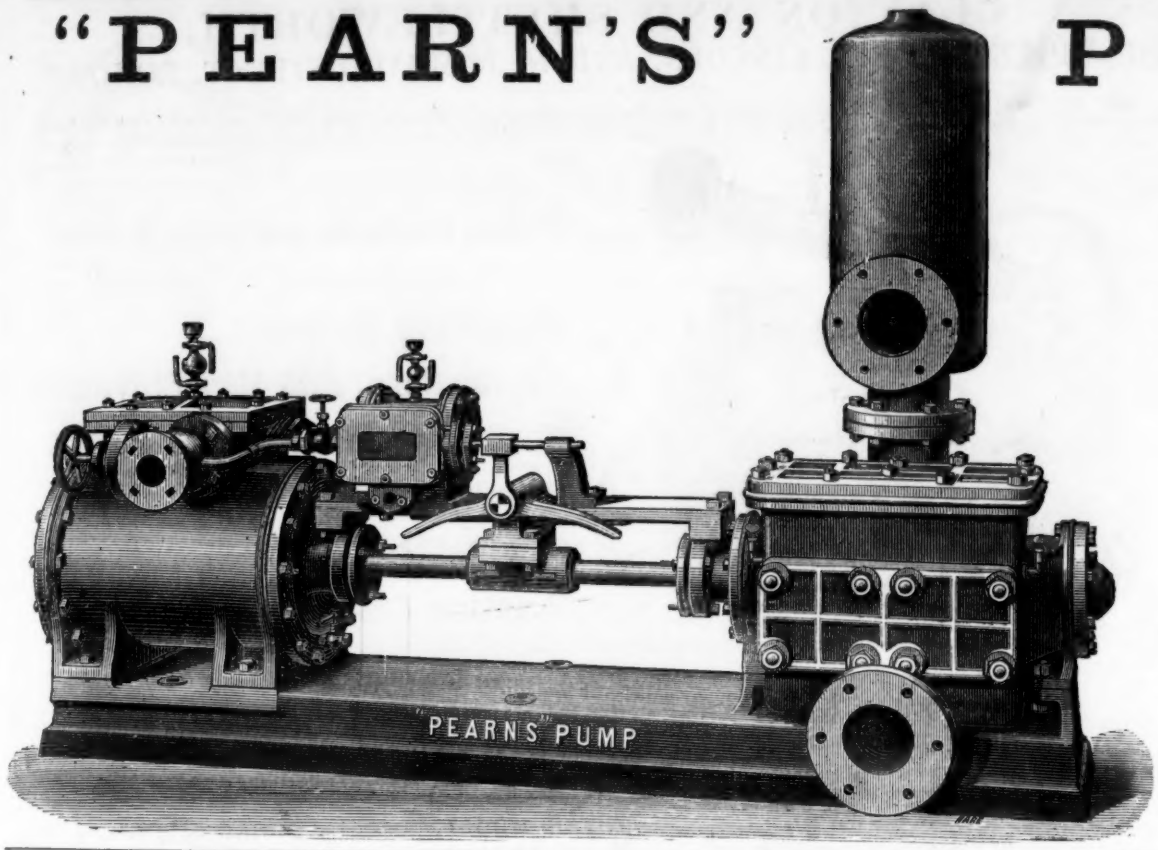
SHEAF WORKS AND SPRING WORKS, SHEFFIELD.
LONDON OFFICES—90, CANNON STREET, E.C. PARIS DEPOT—12, RUE DES ARCHIVES. BOSTON, MASS., U.S.—40, KILBY STREET.

"PEARN'S" PUMP.



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SIMPLICITY AND DURABILITY.

IT HAS NO INTRICATE PARTS, the WORKING PARTS are the same as used in the ordinary STEAM ENGINE.

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DIAMETER OF WATER CYLINDER..... In.	2	2½	3	3½	4	4½	5	6	7	8	9	10	12	14
DIAMETER OF STEAM CYLINDER.....	4 in.	5 in.	6 in.	6 in.	7 in.	7 in.	8 in.	10 in.	12 in.	12 in.	14 in.	14 in.	16 in.	18 in
Length of Stroke	9 in.	9 in.	9 in	9 in.	12 in.	12 in.	12 in.	12 in.	12 in.	18 in.	24 in.	24 in.	24 in.	24 in
Content, Gallons per Hour	950	1500	2160	2940	3840	4860	6000	8640	11590	15360	19440	24000.	34650	46360
Price..... £	18	2[illegible]	24	28	35	38	45	60	70	85	130	140	180	230

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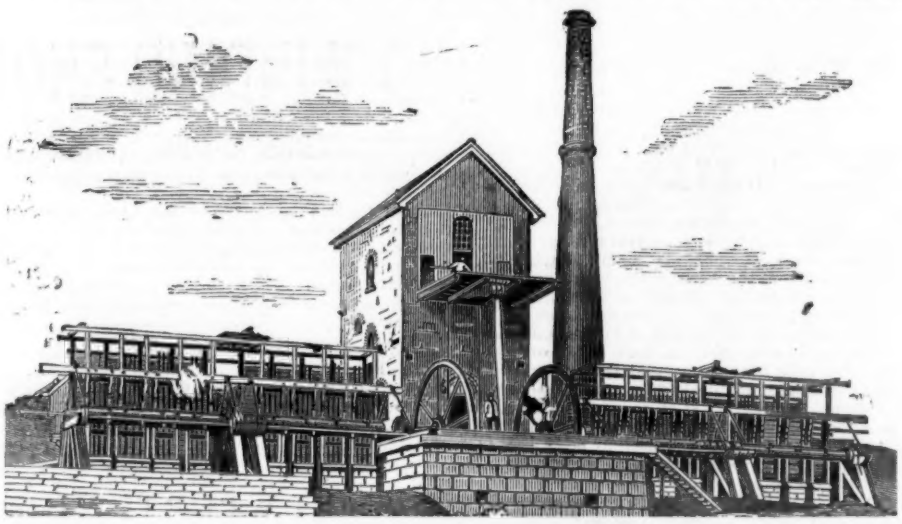

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ALL KINDS OF

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Mining Tools, Files, Saws, Hammers, and Picks.

CANNON STEEL WORKS, SHEFFIELD.

NEW GAS BARS FOR FURNACES.

The ingenious arrangement for the economic utilisation of gas for heating purposes introduced by Mr. T. FLETCHER, of Warrington, have from time to time been referred to in the *Mining Journal*, and he has now patented some gas bars for furnaces which are well worthy of attention. These bars are similar in application to ordinary boiler and other furnace bars for solid fuel, the only difference being that they supply their own fuel, burning gas instead of coal. Several sizes of bars are kept in stock, and they can be made up into furnaces of almost any size and shape as required. With ordinary day pressure of gas they will burn about 100 cubic feet of gas per square foot of surface.

Where a blast of air is available, a special blast attachment can be fitted, which will enable the same burners to consume perfectly any gas supply up to about 1000 cubic feet per hour per square foot of burner surface, which will be found equal in duty to a coal furnace burning 40 to 50 lbs. of coal per square foot of grate. It is, therefore, claimed that these burners have a capacity and power which is difficult, if not impossible, to obtain by any other known means. The engraving shows the burner as made—12 × 10 in. with blast attachment. When used with ordinary gas pressure the gas is supplied to the upper tube A. If used with blast, the gas is applied to the lower tube B, and the blast to the upper tube. The gas supply pipes required are:—Without blast, ¾ in. area of bore per square foot of surface of burner; with blast, five to six times that required without blast.

It is explained that the burners can be made any shape and to give any flame, from ½ in. to 2 ft. 4 in. wide, by any length, up to 8 ft. or 10 ft.—in fact, there is hardly any limit to the shape and power which can be supplied. In applying the burners it must be remembered that no gas burner working without a blast of air will give satisfactory results if the flame is drawn horizontally across the burner by a flue, as the front part of the flame smothers the part behind; the work to be done must be over the burner. With a blast of air the same burners are independent of any side draughts, and will work equally well any side up. The flame may be directed downwards as readily as upwards, and the burner may be placed at any angle or in any position. The burners are made both with the slits as engraved, and also with drilled holes, the latter being the best, as a rule, for draft burners, and the slit burner for use with a blast of air.

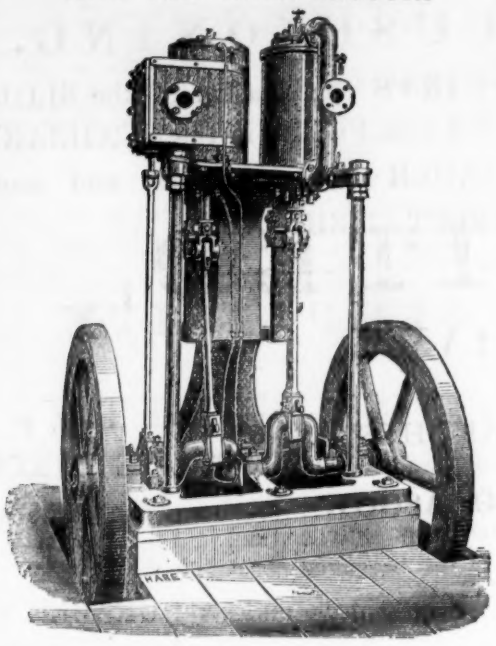
DYNAMITE EXPLOSION AT KIT HILL MINE.—A fatal dynamite explosion occurred here on Sept. 7 from the borer having come in contact with a dynamite cartridge previously unexploded. One man was killed, leaving a widow and four children, and three others were seriously injured, one not being expected to survive.

HOLLOWAY'S PILLS—THE GREATEST BOON OF MODERN TIMES.—These searching pills act directly on the liver, correct the bile, purify the system, renovate the debilitated, strengthen the stomach, increase the appetite, invigorate the nerves, and reinstate the weak to an ardour of feeling never before experienced. The sale of these pills throughout the globe astonishes everybody, convincing the most sceptical that there is no medicine equal to Holloway's pills for removing the complaints which are incidental to the human race. They are indeed a blessing to the afflicted, and a boon to those who suffer from any disorder, internal or external. Thousands of persons have testified that by their use alone they have been restored to health after other remedies had proved unavailing.

THE

"Champion" Rock-borer

AND AIR COMPRESSOR.



The work performed by this machinery, through some of the hardest rock, proves its great value.

In Cornwall, irrespective of the work done by the "Champion" Rock-borers purchased by various Mines, the drivage, rising, stoping, and sinking on the proprietor's own contract work, amounts to over 1070 fathoms.

The wood-cut represents one of these Air-Compressors Four of them, of three different sizes, can be seen, at work, in about an hour's walk through the Camborne Mining District.

R. H. HARRIS,
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CENTRE SECOND STOP WATCH

Has lever escapement, compensating balance case and dome, both sterling English Hall Marked Silver. The most perfect Watch yet introduced. It is usually retailed at £8 8s.; our price, free by post, is £2 15s.; warranted for five years.

Our **NEW ENGLISH LEVER WATCH**, £2 10s., with sterling silver cases, capped and jewelled.

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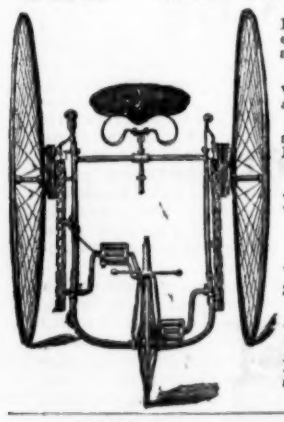
THE "ARION" TRICYCLE,



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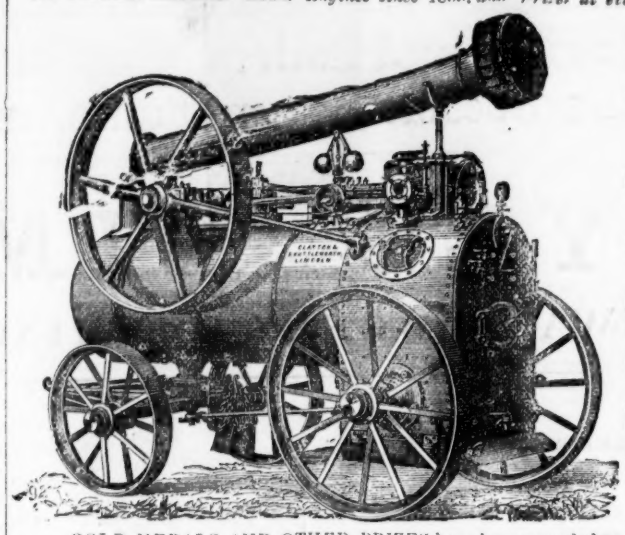

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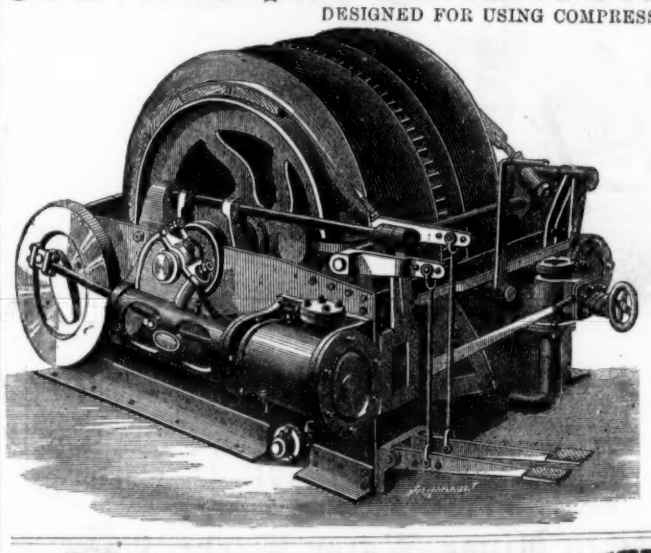

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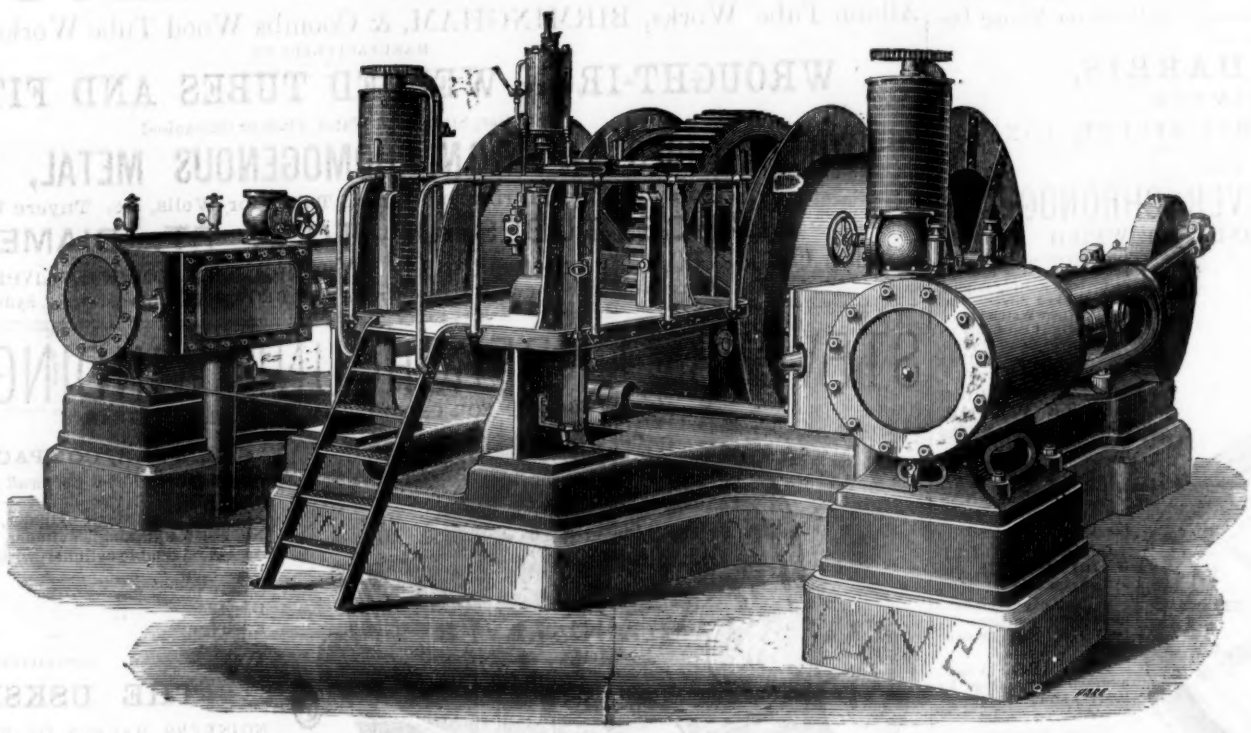

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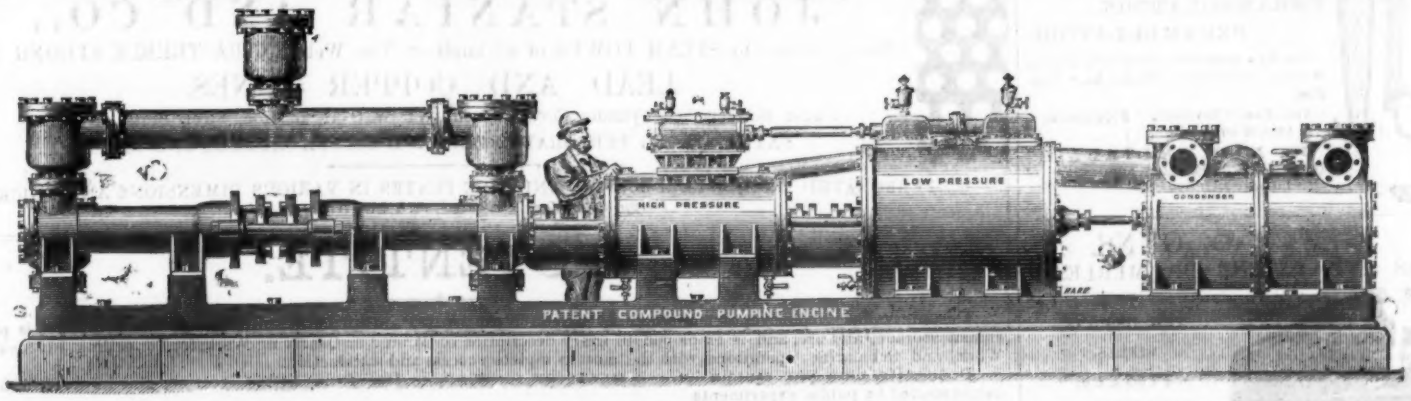

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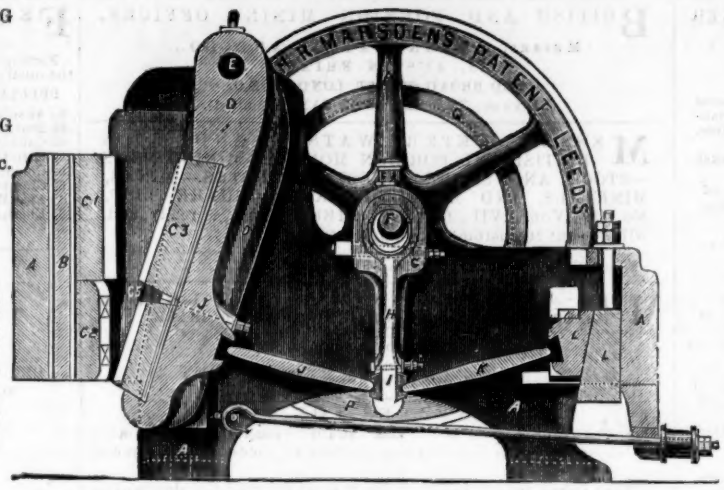
"I have great pleasure in bearing testimony to the merits and capabilities of your patent combined fine crusher and sieving apparatus. I have tried it on a variety of ores and minerals, and it pulverizes them with equal success. You can put in a small paving stone, and bring it out like flour."

"The power required to drive it is very small, being from 4 to 5-horse, and the repairs are almost nil."

"I am sure the machine will be a success, and a great one, and there is any amount of demand for such a machine. We can work it with 20 lbs. of steam, and our engine, which is a 12-h.p., plays with the work, in fact we run the Stonebreaker and the Pulveriser both together with 35 lbs."



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ROAD METAL BROKEN EQUAL TO HAND, AT ONE-TENTH THE COST.

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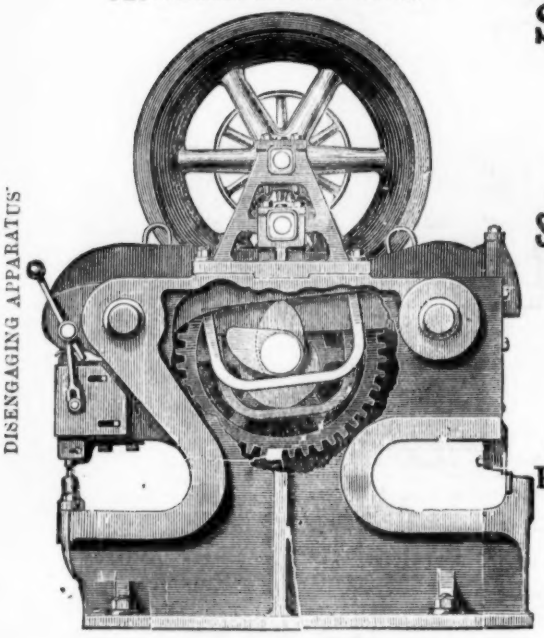

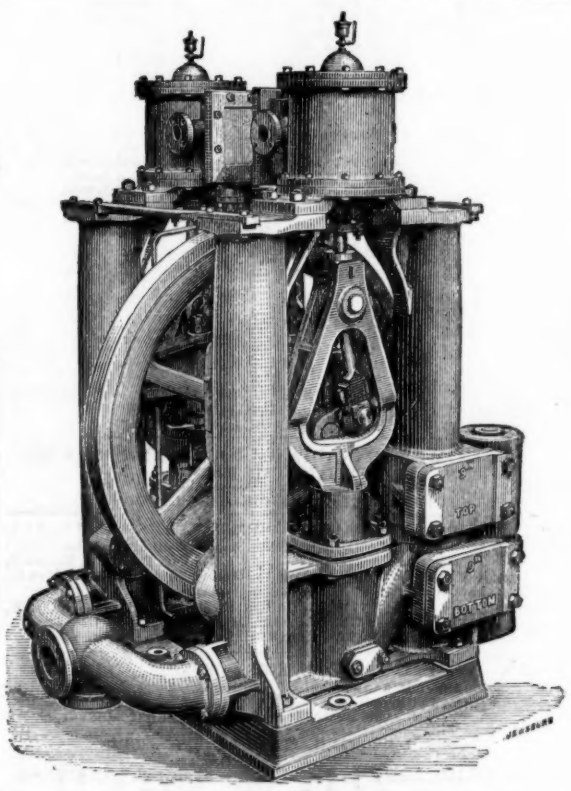

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